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THE THREE-DIMENSIONAL BASIS OF EMOTIONAL INTERACTIONS IN SMALL GROUPS. II [1]

F. KRÄUPL TAYLOR [2]

THE AUTISTIC DIMENSION

The Autistic Dimension contains variables which indicate the distribution of very private and personal phenomena among the members of a group. In this section I shall be mainly concerned with two autistic variables which refer respectively to two global biases. The variables will be operationally defined and designated "Love-Hate Bias" and "Self-Appeal Bias", and they refer respectively to the bias to profess a particular degree of love-hate feelings towards the group as a whole, and the bias to profess a belief in arousing a particular degree of love-hate feelings in the group as a whole.

A high score of Love-Hate Bias indicates a person who regards himself as friendly disposed towards everybody in the group, and a low score indicates a person who professes a dislike towards all his group companions. A person with a high score of Self-Appeal Bias professes to believe that he is generally liked, whereas a person with a low score in this variable professes to assume that he is generally unpopular.

It is obvious that an autistic global bias must be derived from the total of a person's scores of love-hate feelings or guessed self-appeals, i.e. from the total of the scores contained in that person's row in a sociomatrix. But if these row-scores are rank scores, then the sum of all the scores in any one row is the same, namely $\frac{1}{2}n(n-1)$. In other words, the distribution of an autistic global bias cannot be obtained from a rank matrix.

To arrive at an estimate of such an autistic variable we can utilize only the absolute scores of the questionnaire test. These scores yield matrices of love-hate feelings or of guessed self-appeals (cf. the matrix of *Table IVa*). In such

1. Part I of this paper appeared in *Human Relations*, Vol. VII, No. 4, 1954.

2. I am greatly indebted to the Board of Governors of the Bethlem Royal and the Maudsley Hospital for a grant from the Research Fund for the purpose of this study.

matrices the row-scores add up to different totals as is shown in the right-hand marginal column of *Table IVa.*

In order to eliminate the potentially distorting effect of the variable column-totals on the row-totals (a distortion which owes its origin to the blank principal diagonal in a sociomatrix), we shall use the same procedure as that by which we obtained secondary rank matrices; but this time it is the scores in the columns which have to be transformed into secondary rank scores, thus equalizing all the column-totals.

In this way the matrix of *Table IVa* is converted into a matrix of Love-Hate Bias which is shown in *Table VI.*

TABLE VI *MATRIX OF LOVE-HATE BIAS*

	A	B	C	D	E	*a-scale*	*α-scale*
A		3·5	1	1	2·5	8	66·67
B	4		2	4	2·5	12·5	29·17
C	1·5	1		2	1	5·5	87·50
D	1·5	3·5	3		4	12	33·33
E	3	2	4	3		12	33·33
						50	250

A matrix of Self-Appeal Bias is similarly derived from a matrix of guessed self-appeals.

In such a bias matrix all the column-totals are the same and equal $\frac{1}{2}n(n-1)$.

The a-scores of row-totals in the right-hand column can be rendered largely independent of group size by converting them into α-scores, using the formulae shown on page 454, *Human Relations*, 1954.

Before proceeding now with the evaluation of the significance and implications of the α-scales of Love-Hate Bias or of Self-Appeal Bias, some words of caution seem indicated. It would be rash to infer too readily from a bias score the kind of motivation which activated a group member when he estimated his emotional relations in the group. One member, for instance, may obtain a high α-score of Love-Hate Bias because he is obsessionally afraid to give rein to his aggressive trends, and therefore dare not record a feeling of dislike towards anybody; another member with an equally high α-score of Love-Hate Bias may have been motivated merely by a favourable comparison of the group under consideration with certain reference groups towards which he entertains a very negative attitude.

The test reliability of the questionnaire test on which these bias scales are based is not known. It is likely to be much lower than the test reliability encountered in the case of Interpersonal Popularity, which was quite satis-

factory. There is little doubt that a better questionnaire test could be constructed than the one used in this paper.

Bias scores depend on the sincerity and cooperation of the group members in assessing their feelings and assumptions introspectively. In both the therapeutic and non-therapeutic groups it appears that the members have, in general, exerted themselves to be as candid and truthful as possible in their test replies. Yet it would be unwise to accept individual α-scores of such an autistic bias scale as adequate, though it is hoped that the general distribution of the bias scores may approximate the true distribution of the autistic variable.

After this brief interlude of advocating care in the interpretation of results, let us return to the evaluation of bias scales. The more group members differ in their global Love-Hate Bias towards the group, the wider will be the dispersion of these bias scores in the group. This dispersion could be measured in a customary way by calculating, for instance, the variance or standard variation of the scores. In the preceding section on the Public Dimension, however, I have used a coefficient W′ of concordance, which is in fact also a measure of dispersion. For the sake of uniformity I have used the coefficient W′ in bias matrices as well. The coefficient W′, when applied in bias matrices, is, of course, not a criterion of concordance; on the contrary, in these matrices it is a criterion of the discordance and diversity which exists among the global bias attitudes of group members. The higher the W′-value, the greater are the differences of global bias among individual members of that group.

The average W′-values (and their standard errors) in our 20 groups were:

	Average W′
Matrices of Love-Hate Bias	$\cdot 26 \pm \cdot 03$
,, ,, Self-Appeal Bias	$\cdot 35 \pm \cdot 03$

The difference between these average W′-values is significant at the ·05 level ($t = 2 \cdot 1$, D.F. = 38). When a single-sample t-test is applied to the mean of differences between the W′-values, the level of significance is raised to almost ·01 (Mean Difference = ·09, $t = 2 \cdot 82$, D.F = 19).

This result indicates that when group members assess the kind of appeal they have for others they may be governed by autistic motives far more than when they assess their love-hate feelings towards others. The low degree of concordance which exists among the scores of guessed self-appeals (see the section on the Public Dimension) may be partly due to the influence of Self-Appeal Bias as this bias would have the effect of rendering group members less aware of any public phenomena which, if taken into account, would have enhanced the concordance of scores.

Homo- and Hetero-Social Scores of Love-Hate Bias

In groups containing both sexes the Love-Hate Bias of group members

towards their own and the opposite sex can be separately assessed (see *Appendix II*).

The average homo-social value of Love-Hate Bias in the 11 male/female groups with a total membership of 91, in which homo- and hetero-social scores could be assessed, was found to be $51{\cdot}92 \pm 2{\cdot}04$; and the average hetero-social value $48{\cdot}31 \pm 2{\cdot}02$. The difference between these values is not significant.

The correlation coefficient between homo- and hetero-social scores of Love-Hate Bias was $+{\cdot}28$ ($N=91$) which, though significant statistically, indicates only a relatively minor correspondence between the average person's Love-Hate Bias towards the same and the opposite sex in his group.

Homo- and Hetero-Social Scores of Self-Appeal Bias

The average homo-social value of Self-Appeal Bias was $53{\cdot}37 \pm 2{\cdot}20$, and the average hetero-social value $47{\cdot}33 \pm 2{\cdot}12$. The difference between these values is too small to be statistically significant. Yet the application of a single-sample t-test to the differences between individual homo- and hetero-social scores reveals that there is a significant tendency to assume greater popularity in global relations with the same than with the opposite sex (Mean of Differences $= 6{\cdot}03$, $t = 2{\cdot}95$, D.F. $= 90$, $P = {\cdot}01$).

The correlation coefficient between homo- and hetero-social scores of Self-Appeal Bias is $+{\cdot}42$ ($N=91$), which is very highly significant and suggests that, in some persons at least, fantasies concerning narcissistic supplies from others apply equally to male and female companions.

Global Reciprocity Bias

It is plausible to expect that the autistic scales of Love-Hate Bias and Self-Appeal Bias are not independent. There may be a general bias among group members to assume that their global feelings for or against the group are reciprocated by the group. One may term this bias a "Global Reciprocity Bias" to distinguish it from a "Dyadic Reciprocity Bias", which refers to the assumption that the *individual* group partners reciprocate the feelings directed towards them. (The Dyadic Reciprocity Bias need not be the same as the Global Reciprocity Bias.)

The existence and degree of a Global Reciprocity Bias can be easily assessed by calculating the correlation coefficient between α-scales of Love-Hate Bias and Self-Appeal Bias in our 20 groups. This coefficient was found to be $+{\cdot}37$ ($N=151$). It indicates a significant, but not a very marked tendency on the part of group members in general to expect that their global love-hate feelings are requited.

It is, however, likely that a distinction should be made between the Global Reciprocity Bias in men and in women. There is some evidence that the two sexes differ in their readiness to assume a reciprocity of feeling, at

least as far as their global homo-social relations (in both one- and two-sex groups) are concerned. The relevant correlation coefficient for men is +·57 (N=63), and for women +·29 (N=82). The difference between these coefficients is significant at the ·05 level.

Does Love-Hate Bias Influence Public Behaviour in Small Groups?

One of the prime tasks of a group therapist is to discern and evaluate the motivations which influence the behaviour of his patients. He will be guided in this task by his intuitive skill, his knowledge of the patients, his experience and theoretical background, and he will take into account a wide range of information which the patients communicate to him, wittingly or otherwise.

The approach to this problem of behavioural motivations will be less intuitive and less comprehensive here; I merely wish to elucidate a narrow and specific sector in this vast field of motivational research. It may, however, be claimed that this limitation in breadth of vision is compensated, at least partially, by the advantage of using a mode of investigation which enables quantitative comparisons in place of the more usual, merely qualitative differentiations among the phenomena observed.

The specific problem is this: Is the overt and public behaviour of group members influenced by their Love-Hate Bias or Self-Appeal Bias? As a criterion of overt and public behaviour the status of Public Popularity will be used. I shall therefore deal with the questions, whether and to what extent global love-hate feelings towards the group, or the assumptions of being popular (or unpopular) in the group, tend to determine manifest behaviour so distinctly that the positions of popularity are thereby affected.

One aspect of this specific problem has been examined by H. H. Jennings (1950). She investigated a large all-female community (The New York State Training School for Girls), and employed a sociometric technique of study. Her subjects were asked to name those companions with whom they would like to carry out certain pursuits or spend their leisure time. They were free to name as many companions as they liked. The actual number of companions chosen by a subject was regarded as a measure of what Jennings called "emotional expansiveness". It is plausible to assume that "emotional expansiveness" has a fairly close kinship with the variable of Love-Hate Bias, as it is likely that a person who chooses many companions is also a person who regards herself as having a very friendly disposition.

Jennings found that "emotional expansiveness" correlated +·30 (N=133) with the number of girls choosing a subject, i.e. with a measure of the subject's popularity. This correlation was significant at the ·01 level. But when the same subjects were re-tested after an interval of eight months, the correlation was only +·12 and statistically insignificant. This suggests that with closer acquaintance in the passage of time other determinants of public behaviour and of popularity status had gained in importance.

The all-female groups examined here were all therapeutic groups; they were tested when personal acquaintance was still superficial. The correlation between Love-Hate Bias and Public Popularity in three all-female groups (having a W′-value of at least ·50 in their matrices of Public Popularity) was +·37 (N=19), which is of similar magnitude to that in Jennings' first test, though the numbers in my groups are too small for statistical significance.

Jennings was only concerned with the motivational effect of "emotional expansiveness" on a person's popularity. The problem here is, however, not limited to the study of the comparable phenomenon of Love-Hate Bias and its effect on popularity status; it includes the study of Self-Appeal Bias and its influence on popularity status.

If we want to examine the influence of Love-Hate Bias and of Self-Appeal Bias separately, we have to keep the effect of one of the bias scales constant by partial correlation. The partial correlation coefficients between Love-Hate Bias or Self-Appeal Bias and Public Popularity are presented in *Table VII*. (Only those groups have been examined in which the W′-value of concordance in matrices of Public Popularity was at least ·50.)

TABLE VII *PARTIAL CORRELATION COEFFICIENTS BETWEEN LOVE-HATE BIAS OR SELF-APPEAL BIAS AND PUBLIC POPULARITY*

Groups	N	*Love-Hate Bias*	*Self-Appeal Bias*
All-male	22	−·41	+·37
All-female	19	+·34	+·28
Male/female:			
Male homo-social	34	+·07	**+·45**
Male hetero-social		+·04	+·05
Female homo-social	40	**+·38**	+·17
Female hetero-social		**+·38**	+·27
One- and Two-sex:			
Male homo-social	56	−·13	**+·43**
Female homo-social	59	**+·36**	+·20

Significant coefficients are in heavy type.

The results of this table had not been anticipated. It had been tacitly expected—in accordance with the stereotyped concepts of masculine and feminine qualities in our culture—that men would be true to their own feelings towards the group and that, in so far as public behaviour was influenced by global bias, the behaviour of men would candidly reveal their Love-Hate Bias; whereas women had been supposed to depend more on the impression they believed to have made, and thus to reflect in their public behaviour their Self-Appeal Bias rather than their love-hate feelings for the group.

The partial correlation coefficients in *Table VII* do, if anything, contradict this stereotyped assumption. In all-male groups public behaviour is

negatively correlated with Love-Hate Bias, and positively with Self-Appeal Bias. The difference between the two coefficients is significant at the ·02 level. It therefore seems that in all-male groups men have a certain tendency to model their public behaviour on the popularity they imagine to enjoy in the group, and to conceal so successfully their love-hate feelings that these may even appear to be contradicted by their overt behaviour. In the homo-social relations of male/female groups men show a similar tendency to reflect their guessed self-appeals in their overt behaviour. If we therefore jointly consider global homo-social relations of men in both one- and two-sex groups we find that the difference between the partial correlation coefficients is significant beyond the ·01 level. There can therefore be little doubt that men in our groups have, in their homo-social relations, not lived up to expectations based on the social stereotype of masculinity; their public homo-social behaviour has not been true to their real global feelings towards other men, but has been influenced rather by autistic fantasies of their homo-social appeal, so that men who believed themselves popular with their male companions tended to adopt a public role which made them popular with those companions, whereas men who thought they were disliked by other men behaved towards them in such a way that they tended to become unpopular.

In their global hetero-social relations the public behaviour of men was not consistently influenced by either Love-Hate Bias or Self-Appeal Bias.

The women in our groups also tended to belie their social stereotype. In their global homo-social relations in both one- and two-sex groups they had a certain tendency to act in accordance with the Love-Hate Bias they professed to entertain towards their female groups companions. The relevant partial correlation coefficient of +·36 is significantly different at the ·01 level from the corresponding male homo-social coefficient of −·13.

In their global hetero-social relations, women had a similar tendency to reveal their love-hate feelings in overt behaviour. Self-Appeal Bias also seems to have had some influence on the homo- and hetero-social public behaviour of women, though it was less marked than the influence of Love-Hate Bias.

Some objections may be raised to the interpretations which have so far been presented of the partial correlation coefficients in *Table VII*. These coefficients have been viewed as indicating a causal relationship, viz. global autistic bias determining public behaviour. But correlation coefficients do not necessarily imply a causal sequence, whether direct or indirect, between the variables concerned. Generally they have, in fact, no such implications.

However, the problem under consideration here is a problem of behavioural motivation and this of necessity involves the assumption that a causal sequence is examined. The least that could be said about the partial correlation coefficients of *Table VII* is that they do not contradict the assumption that a global autistic bias can, in certain circumstances, determine global behaviour.

Yet such an over-cautious formulation is, in my opinion, unnecessary as the causal interpretation given seems preferable to alternative interpretations. If it were said that the correlation between the variables of bias and popularity was due to their being jointly associated with a third variable, this would either mean the introduction of an unknown, and with it the postponement of any interpretation, or it would merely point out the truism that both bias and popularity depend on activities of one and the same personality in two different contexts: when introspectively assessing feelings, and when acting in front of a group audience.

We have also to examine the possibility that the causal sequence proceeds in the opposite direction from that so far considered; namely, that the popularity status is the stimulus which causes a particular bias response. It may, for instance, appear quite plausible at first sight to say that a Self-Appeal Bias is not an autistic fantasy of one's general popularity enjoyed in the group, but an *awareness* of one's real popularity status. Such a statement would, however, be at variance with some of the findings already reported in this study: that the group members are not very successful in judging their own popularity status; and that guessed self-appeals are significantly more affected by autistic influences than by public phenomena (as is suggested by the relatively low W′ in rank matrices of guessed self-appeals, and the relatively high W′ in matrices of Self-Appeal Bias). We may therefore conclude that, although Self-Appeal Bias may contain an element of awareness of one's real popularity status, the positive partial correlations found between Self-Appeal Bias and Public Popularity, particularly in male homo-social relations, is, broadly speaking, an indication of the extent to which public behaviour has been determined by fantasies and expectations of self-appeal.

It would be even more difficult to defend an interpretation that the positive partial correlations which were found between Love-Hate Bias and Public Popularity, particularly in female homo- and hetero-social relations, revealed the fact that popularity status was the stimulus which caused a particular degree of love-hate feelings as a response, because whatever insight into one's popularity was contained in Love-Hate Bias, it had been removed by partial correlation. The obvious assumption would therefore be that love-hate feelings were an automatic and unwitting reaction to an unconscious awareness of one's popularity. It certainly is simpler to regard love-hate feelings as motivational determinants of public behaviour and of the popularity status acquired by it.

In summary therefore it can be said that Love-Hate Bias or Self-Appeal Bias can be a behavioural determinant in certain circumstances. The autistic self-estimates of emotional attitudes towards the group as a whole, which are expressed in Love-Hate Bias, tend to motivate the public behaviour of women in their global relations to either sex, but they have no consistent effect on the public behaviour of men. Women who think of themselves as friendly, pleasant, and affectionate persons tend to behave publicly in such

a way that they are, in fact, regarded as likeable and popular; on the other hand, women who feel antagonistic and hostile towards the group behave in such a way that the group regards them as disagreeable and unpopular. But the public behaviour of men does not disclose whatever fantasies they have of their global attitudes towards either sex. Their public behaviour towards other men (though not towards women) does however tend to disclose some of the fantasies they have of their general popularity with these other men. A similar tendency is present among women in their public behaviour towards either sex, but this tendency is less marked.

THE DYADIC DIMENSION

The public dimension, as we saw, refers to phenomena arising out of an actor-audience relationship; the dyadic dimension, which will be considered in this section, refers, on the other hand, to qualities which characterize an actor in his relations with individual partners. Autistic phenomena may refer to either of these relationships, though the autistic biases, mentioned in this paper in the section on the autistic dimension, dealt only with the global actor-group relations.

The methodological problem of measurement which dyadic variables present is very different from that which we have encountered so far. In order to describe and explain the procedures I have adopted in measuring dyadic phenomena, I shall use as an illustration the variable ability of individuals to form mutual love-hate feelings in their dyadic relations. This dyadic variable will be operationally defined and termed Love-Hate Mutuality. An account of other dyadic variables will be given in later papers.

In *Table VIII* is shown an example of a combined rank matrix of love-hate feelings, which had been obtained in one of my therapeutic groups of six patients.

TABLE VIII *COMBINED RANK MATRIX OF LOVE-HATE FEELINGS*

	A	B	C	D	E	F	
A		1	3	2	4	5	
B	1		5	3	2	4	
C	1	3		2	5	4	
D	2	3	1		5	4	
E	2	1	3	4		5	
F	2	5	1	3·5	3·5		
	8	13	13	14·5	19·5	22	= a-scale } of Interpersonal
	85	60	60	52·5	27·5	15	= α-scale } Popularity

If I want to know how closely a person's dyadic love-hate feelings agree

with those same feelings of his individual partners toward him, I have to compare his row-scores in this matrix with the corresponsing column-scores. The greater the similarity between the scores in these two arrays, the greater is the person's ability to form dyadic relations of mutual love-hate feelings—the higher, that is, should be his position on a dyadic scale of Love-Hate Mutuality.

It may, at first glance, appear that the problem of assessing the similarity between the corresponding scores of two arrays, can be solved by any of the customary methods of statistical correlation. However, on closer inspection of our arrays it emerges that correlation procedures, such as the product-moment method, which has been chiefly used in this paper, are not very suitable. One of our arrays—the row—consists of rank scores ranging from 1 to $(n-1)$, but the other array—the column—contains rank scores of a widely varying range; it may even happen that all the rank scores in a column are identical. In fact, the more extreme a person's popularity status, the more uniform will his column-scores in a rank matrix of love-hate feelings tend to be. The result of such a uniformity of column-scores would be to make the use of a correlation procedure impossible: the correlation coefficient would be indeterminate, corresponding to a fraction with zero in both numerator and denominator. As the dyadic qualities of people who are very popular or very unpopular are of special interest, and as the correlation coefficients between row- and column-scores of such people tend to become indeterminate the more extreme their popularity positions, I was obliged to try to devise a more suitable method of assessing the degree of agreement between corresponding row- and column-scores in a ranked sociomatrix.

I started by computing, for every group member, the sum of the squared differences of these scores. This sum I shall call a b-score. The smaller a person's b-score, the greater the mutuality of love-hate feelings in his dyadic relations.

The magnitude of a b-score is, of course, partially dependent on group size. The larger the group the larger will the b-scores in it tend to be. To eliminate the effect of group size I endeavoured to use a similar device as in the case of a-scores, namely, to express b-scores as percentages of the maximum range of b-scores in a group of a given size n.

I had to establish first the extent of this maximum range of b-scores. It was obvious that the least possible value is zero; this would happen when all the corresponding row- and column-scores of a group member are identical. The manner in which the highest possible b-score (or rather, the b-score which would be potentially highest in the group generally) was calculated, is set out in *Appendix III*. This maximum b-score (which is also the maximum range of b-scores) was found to be $\frac{1}{3}n(n-1)(n-2)$. It should be noted, however, that under freak conditions it is possible for an individual to attain a b-score in excess of this maximum.

The general maximum of a b-score, which has just been quoted, does not take account of tied rankings among the row-scores of a group member. Such tied rankings cause a reduction of the maximum b-score, which becomes $\frac{1}{3}n(n-1)(n-2)-3T'$, where T′ has the same meaning as in the formula for W′ on page 452, *Human Relations*, 1954.

It is now possible to make b-scores largely independent of group size by expressing them as percentages of the general maximum range of b-scores. These percentages will be called B-scores. As the magnitude of these B-scores is inversely related to the magnitude of the dyadic variable they measure, a further conversion into, what I shall call, β-scores is necessary. This will be done simply by subtracting B-scores from 100.

The formulae transforming b-scores into β-scores are therefore:

$$\beta = 100 - B$$

$$B = 100 \frac{b}{\frac{1}{3}n(n-1)(n-2)-3T'}$$

b = sum of the squared differences between the corresponding row- and column-scores of a person

$T' = \frac{1}{12}\sum_{t}(t^3-t)$, where t refers to a set of ties in the row of the person concerned.[3]

A group member with a high β-score of Love-Hate Mutuality is a person who reacts in his dyadic relations in such a way that his love-hate feelings towards individual partners tend to be reciprocated by them; on the other hand, a low β-score indicates a person who tends to evoke feelings in his individual partners which are in contrast to his own. As B-scores may, in certain circumstances, exceed 100, we shall occasionally encounter negative β-scores. If the feelings recorded by the partners of a person are merely due to chance, the β-score will have the average value of 50.

When homo- and hetero-social β-scores are required, the denominator in the above formula for B needs a further adjustment (see *Appendix III*).

Fractional Mutuality Scores ("Mutuality of Choice" and "Mutuality of Rejection")

Love-Hate Mutuality takes into account the total range of love-hate feelings which a person feels towards individual partners, extending from affection to dislike. A high β-score of Love-Hate Mutuality thus indicates that the partners of a group member reciprocate his feelings, whether these are feelings of affection, indifference, or enmity.

It is important to realize that Love-Hate Mutuality is therefore essentially

3. Any group member who had scored tied rankings for all his companions (i.e. for whom $t=n-1$) has been excluded from the matrix before the calculation of dyadic variables for that group.

different from the mutuality of scores with which sociometrists have concerned themselves. Sociometrists can only deal with a fractional mutuality, either with a "mutuality of choice" or a "mutuality of rejection".[4]

It seems to have been widely assumed that "mutuality of choice" is a phenomenon of great practical significance as it has been regarded as an important influence in the forming of spontaneous groups. It is indeed plausible to expect that people who like each other will tend to seek each others' company. The greater the mutuality of attraction, the more united and closely knit would be the resulting group. When mutuality of attraction is a feature of all dyadic relations in a group, one may speak, as Festinger (1949) has suggested, of a "clique".

Whether, in fact, "mutuality of choice" is associated with the formation of spontaneous groups does not appear to have been examined empirically. Even less attention has been paid to the effect on groups of the other fractional mutuality, the "mutuality of rejection".

There are, however, some sociometric investigations on the relationship between fractional mutuality and status of popularity. It appears that "mutuality of choice" may be a characteristic of popular persons, and "mutuality of rejection" of unpopular persons. H. H. Jennings (1950), for instance, reported correlation coefficients of +·60 and +·70 between "number choosing subject" (indicating popularity status) and "number reciprocating him" (indicating mutuality of choice). In computing these relations, "unchosen individuals" had been excluded from the data "so as not to bolster the correlation". In other words, had these "unchosen individuals" been considered as well, the correlation coefficients would have been higher still. H. H. Jennings also found that a positive correlation existed between "number rejecting the subject" (indicating unpopularity) and "number mutually rejecting him" (indicating mutuality of rejection); omitting "unrejected individuals" from her computation, she obtained coefficients of +·62 and +·73. Again, these coefficients would have been larger, had all the individuals in the groups been taken into account.

Maucorps (1949), who also investigated the relationship between variables which one might term popularity and "mutuality of choice", obtained correlation coefficients of +·83. He had not excluded unchosen individuals from his data and this may explain the higher coefficient.

These are very striking figures and they have been generally accepted as proof that popular persons tend to behave in such a way that they form relations of mutual attraction with other popular persons; whereas unpopular persons tend to behave in such a way that they form relations of mutual rejection with other unpopular persons.

Yet this interpretation of the high correlations between popularity and

4. A "mutuality of indifference" has hardly ever been considered by sociometrists. In fact, they have generally neglected feelings of indifference. A notable exception is the paper by Lemann and Solomon (1952).

"mutuality of choice", and between unpopularity and "mutuality of rejection", is open to doubt. It can be shown that in a hypothetical group model in which there are no interactions between individuals, but only public actor-audience relations, a high correlation between top-popularity scores and "mutuality of choice", and also between bottom-popularity scores and "mutuality of rejection", exists as an artefact. In such a hypothetical group a ranked matrix of love-hate feelings would be the same as a matrix of Public Popularity, and this matrix would reveal a maximum concordance among the group members. *Table IX* shows such a matrix of maximum concordance.

TABLE IX *RANKED SOCIOMATRIX OF MAXIMUM CONCORDANCE*

	A	B	C	D	E	F	G
A		1	2	3	4	5	6
B	1		2	3	4	5	6
C	1	2		3	4	5	6
D	1	2	3		4	5	6
E	1	2	3	4		5	6
F	1	2	3	4	5		6
G	1	2	3	4	5	6	
a-scale	6	11	16	21	26	31	36
α-scale	100	83·33	66·67	50	33·33	16·67	0

If we deleted from *Table IX* all scores above the rank of 3, we would be left with only top-popularity scores or "choices". In that case, a high "mutuality of choice" would appear to exist in the left upper corner of the matrix, i.e. among the top-popular group members A, B, and C. Similarly, if we deleted all scores below the rank of 4, a high "mutuality of rejection" would appear to exist in the right lower corner among the most unpopular group members E, F and G.

We can attempt to quantify this observation and to express the association between popularity status and fractional mutuality score by means of a correlation coefficient.

If we take into account only the squared differences between the first three row-scores of a group member and the column-scores which correspond to them, we can add them to obtain a sum of squared differences. Such a sum may be considered as indicating "mutuality of choice" (the smaller the sum, the higher the mutuality indicated). Correlating these sums with the a-scores of popularity status (the smaller the a-score, the higher the status) we obtain a coefficient of $+\cdot 86$. The same value, though of opposite sign, results if the last three row-scores of each group member are treated in the same manner.

This coefficient of ·86 is of approximately the same magnitude as the

coefficients obtained by Jennings and by Maucorps. The findings of these authors may therefore signify no more than the fact that one and the same matrix had been used for the derivation of the measures of both popularity and fractional mutuality. It is thus questionable whether the sociometric measures of "mutuality of choice" and "mutuality of rejection" do indeed indicate what they are supposed to indicate, namely, the existence of reciprocated feelings in dyadic relations; or whether they are mere artefacts of measurement and indicate only the public phenomenon of popularity status, quite irrespective of any dyadic interaction.

Love-Hate Mutuality and Public Popularity

It is now necessary to examine whether the variable of Love-Hate Mutuality will share the fate of the fractional mutuality scores of the sociometrists and be found to be so closely linked with popularity status that it has to be regarded either as an artefact of measurement or as a phenomenon which is characteristic, not of a person's behaviour in dyadic relationships, but of his public behaviour and status.

To exclude the possibility of an artefact we have to know what apparent relationship exists between Love-Hate Mutuality and Public Popularity in a hypothetical group model in which there is no dyadic interaction, but in which the members are perfect judges of the hierarchy of popularity and achieve complete agreement in their estimates of the popularity status of their partners. In such a hypothetical group the matrix of Public Popularity would therefore be a matrix of maximum concordance. The question is, what relationship appears to exist between Public Popularity and Love-Hate Mutuality in such a matrix. This apparent relationship will be briefly termed "artefact relationship".

This artefact relationship can then be compared with the empirical relationship between the two variables which exists in actual groups. If the two relationships should be found to be of similar magnitude and direction, the variable of Love-Hate Mutuality may be a mere artefact of measurement and would best be discarded.

The mathematical equations of the artefact relationship between Love-Hate Mutuality and Public Popularity are presented in *Appendix IV*. *Fig.* 1 gives an illustration of the curve that would have been obtained from the matrix of 7 members shown in *Table IX*.

The curve in *Fig.* 1 is a parabola, corresponding to the formula

$$\beta_i = \frac{150}{n} + \frac{3(n-1)}{n}\alpha_i - \frac{3(n-1)}{100n}\alpha_i^2,$$

in which β refers to β-scores of Love-Hate Mutuality; α to α-scores of Public Popularity; n to group size (i.e. 7 in *Fig.* 1); and the subscript i to the position in the hierarchy of popularity, a position which can vary from 1 to n.

This formula demonstrates that there is a perfect, though curvilinear, artefact relationship between the two variables. An average status of Public Popularity is spuriously linked with a high degree of Love-Hate Mutuality, whereas a very popular or very unpopular status is spuriously linked with low Love-Hate Mutuality.

By erecting an ordinate in *Fig.* 1 at the mean α-score of Public Popu-

FIGURE 1 *ARTEFACT RELATIONSHIP BETWEEN β-SCORES OF LOVE–HATE MUTUALITY AND α-SCORES OF PUBLIC POPULARITY IN A MATRIX OF SIZE SEVEN AND MAXIMUM CONCORDANCE*

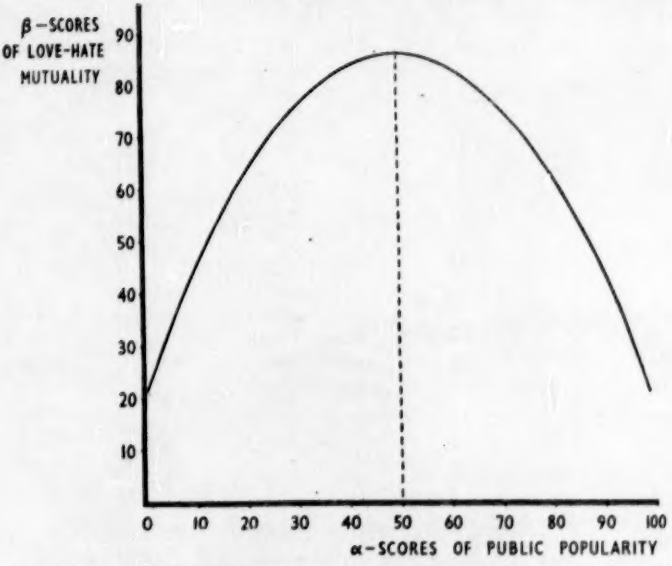

FIGURE 1. Artefact Relationship between β-scores of Love-Hate Mutuality and α-scores of Public Popularity in a Matrix of Size Seven and Maximum Concordance.

larity (i.e. at the α-score of 50) we can divide the parabola into a popular and unpopular half.

The artefact product-moment correlation between Love-Hate Mutuality and the popular (or unpopular) half of Public Popularity can be calculated (see *Appendix IV*). For the popular half it is

$$r = -\sqrt{\frac{15n^2}{16(n^2-1)}} = -\cdot 968\sqrt{\frac{n^2}{n^2-1}}$$

For the unpopular half the correlation coefficient is of the same size but of positive sign.

In this formula, n must be at least 4. For n=4 the correlation coefficient is ∓1·0. As n increases in size, the coefficient quickly approaches its lowest absolute limit of ·968. Its lowest limit will be regarded as the value of the artefact relationship, and will be compared with empirical values.

Public Popularity is, as we have seen, very highly correlated with Interpersonal Popularity (r=+·81). As the variable of Interpersonal Popularity is derived from the same matrix which also yields the variable of Love-Hate Mutuality, it is of interest to compare the respective correlation coefficients of Public and Interpersonal Popularity with Love-Hate Mutuality, which were empirically observed in actual groups. These coefficients are presented in *Table X*.

TABLE X *CORRELATION COEFFICIENTS OF LOVE-HATE MUTUALITY WITH INTERPERSONAL AND WITH PUBLIC POPULARITY RESPECTIVELY*

Popular Half

Groups	N	r *of Interpersonal Popularity*	*Groups*	N	r *of Public Popularity**
Therapeutic Groups			*Therapeutic Groups*		
3 all-male	11	−·58	3 all-male	11	+·59
5 all-female	17	−·58	3 all-female	9	−·19
8 male/female	32	−·17	6 male/female	21	−·32
Student Groups			*Student Groups*		
4 male/female	21	−·52	3 male/female	16	−·17
All groups	81	−·39	All groups	57	−·12

Unpopular Half

Therapeutic Groups			*Therapeutic Groups*		
3 all-male	11	+·57	3 all-male	11	+·23
5 all-female	15	+·72	3 all-female	10	+·34
8 male/female	26	+·65	6 male/female	25	+·06
Student Groups			*Student Groups*		
4 male/female	18	+·24	3 male/female	12	−·03
All groups	70	+·55	All groups	58	+·10

* Only those groups were included in which the W'-coefficient of the Public-Popularity matrix was at least ·50.

It will be seen that some artefact relationship may exist between Love-Hate Mutuality and Interpersonal Popularity. All the individual correlation coefficients have the same sign as the artefact relationship and many of them are of statistically significant magnitude. When all our groups are taken into

account, the coefficients, in both the popular and unpopular half, are significant far beyond the ·01 level of confidence.

The fact, therefore, that both Love-Hate Mutuality and Interpersonal Popularity are derived from the same matrix, seems to have a significant effect on the relationship between them. This finding adds further justification to the previous decision to discard Interpersonal Popularity as a measure of public popularity status because of its uncertain validity. At the same time it is obvious that Interpersonal Popularity is not just an artefact because the empirical correlation coefficients of $-\cdot 39$ and $+\cdot 55$ are very significantly different from the artefact value of $\mp\cdot 968$.

Turning now to the correlation coefficients of Love-Hate Mutuality with Public Popularity, we find a completely different picture. Not all the individual coefficients have the sign which an artefact relationship would have caused, and none of them is statistically significant. It seems therefore, that, by and large, Love-Hate Mutuality and Public Popularity are uncorrelated.[5]

The use of product-moment correlations to obtain the coefficients of *Table X* is, however, open to some objection, as there is no doubt that the artefact relationship between Love-Hate Mutuality and Public Popularity is a curvilinear one. To add further evidence that the empirical values of Love-Hate Mutuality are not distorted by any artefact relationship with Public Popularity, an analysis of variance can be carried out, and the null hypothesis tested that the status of Public Popularity has no effect on the average and the distribution of empirically found scores of Love-Hate Mutuality.

For this purpose the group members were divided into three sections according to their status of Public Popularity. The dividing lines were arbitrarily chosen:

Top-popularity section: α-scores of Public Popularity from 70–100 (both values inclusive)
Middle-popularity section: α-scores from 30–70 (both values exclusive)
Bottom-popularity section: α-scores from 0–30 (both values inclusive)

In *Table XI* are set out the number of persons, the mean, and the standard deviation of β-scores of Love-Hate Mutuality in each of the three sections of popularity. Considering all the groups (therapeutic and non-therapeutic) it will be seen that the standard deviations are of similar magnitude in each section. The same is true of the mean β-scores of Love-Hate Mutuality. An analysis of variance demonstrates this clearly. The ratio of the Mean Squares is near unity, confirming the null hypothesis that the variance between the means is due to chance and not to any influence derived from popularity status.

5. The unexpectedly large and positive correlation of $+\cdot 59$ which was found in the popular half of all-male groups and which is significantly different from the other correlation coefficients in that category requires further examination.

TABLE XI *ANALYSIS OF VARIANCE OF LOVE-HATE MUTUALITY IN DIFFERENT SECTIONS OF PUBLIC POPULARITY*

		Top-Popularity Section	*Middle-Popularity Section*	*Bottom-Popularity Section*
Therapeutic Groups	N	25	36	26
	Mean	64·06	64·17	59·30
	S.D.	16·46	15·03	16·50
Student Groups	N	9	11	8
	Mean	70·68	69·12	66·99
	S.D.	16·65	11·83	12·54
All Groups	N	34	47	34
	Mean	65·82	65·34	61·10
	S.D.	16·53	14·42	15·81

	D.F.	*Sum of Squares*	*Mean Squares*
Between-section	2	477	238·5
Within-section	112	26,821	239
Total	114	27,298	

Love-Hate Mutuality as a Dyadic Phenomenon

Having thus shown that Love-Hate Mutuality is independent of the public phenomenon of popularity, it remains for me to demonstrate that it is, in fact, a dyadic phenomenon which depends on person-to-person interaction.

If Love-Hate Mutuality is a dyadic phenomenon, two hypotheses can be formulated: 1. that the average β-score of Mutuality in small groups is significantly greater than the chance β-value of 50, and 2. that the greater the opportunity of dyadic contact in small groups, the greater the average β-score of Mutuality in them.

The average β-score of Love-Hate Mutuality among the 112 patients of our therapeutic groups was $62{\cdot}78 \pm 1{\cdot}54$ (see *Table XII*). This is very significantly different from the chance value of 50, and is in accordance with the first hypothesis. It should be mentioned, however, that Tagiuri, Blake, and Bruner (1953), in an investigation based on fractional mutuality scores, had found—to their own surprise—that their pooled scores for mutual choice, indifference, and rejection did not significantly exceed a chance value which they had ingeniously derived from a "robot group", constructed by them to match some of the qualities of the members of their real groups. The validity of their finding is, however, open to doubt, not only because of the frac-

tional scores used, but also because they had built their "robot groups" in a way that yielded an excessively high chance value of mutuality. Almost half the dyadic relations in the "robot groups" showed emotional mutuality.

TABLE XII *β-SCORES OF LOVE-HATE MUTUALITY IN THERAPEUTIC AND STUDENT GROUPS*

	N	M	S.D.
Therapeutic Groups			
All-male	22	64·37	13·67
All-female	32	65·96	17·31
Male/female	58	60·42	16·58
Total	112	62·78	16·32
Student Groups			
Male/female	39	69·64	13·46

With regard to the second hypothesis the following considerations are revelant. In therapeutic groups the manner in which the patients meet, and often also the deliberate policy of the doctor, discourages private and close dyadic interactions. Furthermore, therapeutic groups were tested at an early stage of their existence when there had been relatively little opportunity for personal contacts outside the rather formal group sessions. Both these conditions were absent in the student groups. The students could mix freely outside official group meetings and, at the time of testing, their groups had been in existence for a much longer time than the therapeutic groups. The students, therefore, can be expected to have formed much closer dyadic relations and, as a consequence, a greater degree of emotional mutuality in their dyadic relations, if the second hypothesis is correct.

Table XII presents the respective β-scores of Love-Hate Mutuality in therapeutic and student groups. The findings agree with the second hypothesis. The average Love-Hate Mutuality is higher in student than in therapeutic groups, and the difference is statistically significant ($t=2{\cdot}36$, D.F.$=149$, $P={\cdot}02$).

In addition, it can be seen from *Table XI* that the greater degree of Mutuality in student groups occurs in all popularity sections.

All these results support the claim that the scores of Love-Hate Mutuality indicate a dyadic phenomenon.

Finally, it is of interest to explore male/female therapeutic and student groups with regard to the homo- and hetero-social aspects of Love-Hate Mutuality.

The revelant data are presented in *Table XIII.*

As might have been expected, both the homo- and hetero-social scores

of Love-Hate Mutuality are greater among students than among patients. However, only the hetero-social difference is statistically significant ($t=2{\cdot}65$, $D.F.=95$, $P={\cdot}01$).

TABLE XIII *HOMO- AND HETERO-SOCIAL β-SCORES OF LOVE-HATE MUTUALITY IN MALE/FEMALE THERAPEUTIC AND STUDENT GROUPS*

	N	*Homo-social Relations*		*Hetero-social Relations*	
		Average	S.D.	Average	S.D.
Therapeutic Groups	58	58·69	29·84	62·51	24·47
Student Groups	39	66·32	22·59	72·56	19·74

The standard deviations of these homo- and hetero-social β-scores are larger than those encountered before. This may, however, be an artefact due to the method of calculating these scores.

Summary

Three autistic variables were examined: the global bias to profess a particular degree of love-hate feelings towards the group as a whole ("Love-Hate Bias"); the global bias to profess a belief in arousing a particular degree of love-hate feelings in the group as a whole ("Self-Appeal Bias"); and the bias to assume that one's global Love-Hate Bias is reciprocated by the group ("Global Reciprocity Bias").

Men did not, in general, reveal their global bias towards the group publicly, but if they imagined themselves popular in their global homo-social relations with other men (both in one- and two-sex groups) they regulated their public behaviour in such a way that they indeed tended to become popular with their male companions generally; and the opposite was true if men imagined themselves to be unpopular with their own sex.

Women tended, in general, to regulate their public behaviour towards men or women in accordance with their global attitudes towards them. If they thought of themselves as friendly and affectionate persons, they behaved in such a way that they became likeable; on the other hand, if they felt antagonistic towards the group, their behaviour tended to become disagreeable.

Another sex difference became apparent when Global Reciprocity Bias was analysed. Men were significantly more inclined than women to assume that their global feelings towards a group of their own sex were reciprocated.

There was a minor but significant tendency among the members of male/female groups to be more popular with their own sex and to expect greater friendliness from it.

Only one dyadic variable was examined as the method of estimating

such variables is reported for the first time in this paper. The variable examined has been termed Love-Hate Mutuality. It indicates the degree to which dyadic love-hate feelings are reciprocated.

It has been shown that the fractional mutuality scores of the sociometrists (i.e. "Mutuality of Choice" and "Mutuality of Rejection") are possibly artefacts. The correlations which had been reported in the literature between fractional mutuality scores and popularity status seemed to suggest that popular persons are united by mutual choice, and unpopular persons divided by mutual rejections. However, the size of these correlations is approximately the same as the artefact value of a correlation between these variables in a hypothetical group in which no dyadic interaction exists.

The dyadic variable of Love-Hate Mutuality which has been described in this paper is not such an artefact because it could be shown to be independent of Public-Popularity status. The degree of Love-Hate Mutuality in small groups was found to be significantly higher than chance, and to vary directly with the opportunity which exists in those groups, for making dyadic contacts.

APPENDIX III

The Derivation of the β-scores of Love-Hate Mutuality

The derivation of the β-scores of Love-Hate Mutuality presupposes a knowledge of the highest possible b-score of squared differences between corresponding row- and column-scores in a sociomatrix. My first task is therefore to establish the highest possible value which b-scores can attain.

The row-scores of a group member are rank scores extending from 1 to $(n-1)$. For the purpose of a simplified argument we shall assume these rank scores to be arranged in natural order. But the argument holds good for any other arrangement of the rank scores.

The pattern and arrangement of the column-scores can vary widely: from a set of $(n-1)$ equal scores to a set of rank scores extending from 1 to $(n-1)$.

If only one corresponding pair of row and column is considered, then the highest b-score is obtained when the upper half of the column contains only rank scores of size $(n-1)$, and the lower half only rank scores of size 1. But rank scores of a particular size occur only n times in the whole sociomatrix. The supply of rank scores of size 1 or $(n-1)$ would therefore soon be exhausted, if we tried to apply this model of obtaining a maximum b-score to the whole sociomatrix. The model can, in fact, only hold good under freak conditions, and then only for one, or at most two, group members.

The maximum b-score, applicable to all group members, occurs in a sociomatrix of the type considered here (i.e. in which the row-scores are rank scores in natural order) when all the columns of the sociomatrix consist

of rank scores which run from top to bottom in reverse natural order, i.e. from $(n-1)$ to 1.

If we denote a row-score in such a sociomatrix by R and a column-score by C, the maximum b-score is

$$b_{max} = \Sigma R^2 + \Sigma C^2 - 2\Sigma RC$$

The sum of R^2 and C^2 corresponds each to the sum of squares of the first $(n-1)$ natural numbers, i.e. to $\frac{1}{6}n\,(n-1)\,(2n-1)$.

$$\Sigma RC = 1(n-1)+2(n-2)+\ldots+(n-1)[n-(n-1)]$$
$$= \tfrac{1}{2}n^2(n-1)-\tfrac{1}{6}n(n-1)(2n-1)$$

Therefore $b_{max} = \frac{1}{3}n(n-1)(n-2)$

This formula might have been more quickly obtained from the well-known formula for rank correlation coefficients,

$$\rho = 1 - \frac{6S(d^2)}{(N^3-N)}$$

if $S(d^2)$ had been replaced by b, N by $(n-1)$, and ρ by -1. The fuller derivation of b_{max} presented here was necessary to facilitate the consideration of tied rankings.

If tied rankings are present among the row-scores, they have the effect of reducing the maximum b-score.

Let us consider a set of t consecutive row-scores, extending from (p_k+1) to (p_k+t), together with their corresponding column-scores, in the model sociomatrix which yields the above maximum b-score.

Row-scores $(R_1) : (p_k+1), (p_k+2), \ldots, (p_k+t)$

Column-scores $(C_1) : [n-(p_k+1)], [n-(p_k+2)], \ldots, [n-(p_k+t)]$

If the t row-scores are tied scores, they all assume the same value, namely $K = [p_k+\frac{1}{2}(t+1)]$. The sum of squared differences $(b_{1_{tied}})$ between the t tied row-scores and the corresponding column-scores is then

$$b_{1_{tied}} = tK^2 + \Sigma C_1^2 - 2K\Sigma C_1$$

The difference (D) between the b_1-scores, obtained when the t row-scores are consecutive, and the $b_{1_{tied}}$-scores, obtained when the t row-scores are tied, is

$$D = b_1 - b_{1_{tied}} = \Sigma R_1^2 - 2\Sigma R_1 C_1 - tK^2 + 2K\Sigma C_1$$

As $\Sigma R_1 C_1 = ntK - \Sigma R_1^2$, and $\Sigma C_1 = nt - tK$,

$$D = 3[\Sigma R_1^2 - tK^2]$$

The expression in brackets in this last formula of D corresponds to the difference between the sum of squares of t consecutive rank scores (ΣR_1^2) and the sum of squares when these t rank scores are tied (tK^2). It can be easily shown [see, for instance, Kendall (1948, p. 31)] that the expression in brackets is $\frac{1}{12}(t^3-t) = T'$.

If there are several sets of tied rankings in a row, then

$$T' = \tfrac{1}{12}\sum_t (t^3 - t)$$

It follow that

$$D = 3T' = \tfrac{1}{4}\sum_t (t^3 - t)$$

In other words, if tied rankings exist in a row, the maximum b-score is reduced by $3T'$:

$$b_{max} = \tfrac{1}{3}n(n-1)(n-2) - 3T'.*$$

The b-score, obtained from the row- and column-scores of a particular group member, is expressed as a percentage of the maximum b-score by the formula

$$B = 100\frac{b}{\tfrac{1}{3}n(n-1)(n-2) - 3T'}$$

and finally we obtain β,

$$\beta = 100 - B$$

It should be noted that β can occasionally be negative, because the model sociomatrix, yielding our maximum b-score, does not exclude the possibility of occasional freak conditions which can produce a b-score of greater value than our general maximum b-score.

To obtain homo- and hetero-social β-scores a further correction is necessary. In a male/female group, containing m men and f women, the denominator in the formula for B [namely, $\tfrac{1}{3}n(n-1)(n-2) - 3T'$] has to be multiplied by the following ratios:

homo-social relations of men: $\dfrac{m-1}{n-1}$

" " " " women: $\dfrac{f-1}{n-1}$

hetero-social relations of men: $\dfrac{f}{n-1}$

" " " " women: $\dfrac{m}{n-1}$

APPENDIX IV

Artefact Relationship between β-Scores of Love-Hate Mutuality and α-Scores of Public Popularity in a Matrix of Maximum Concordance

We shall assume that the popularity hierarchy in the matrix of maximum concordance is arranged in descending order from the most to the least

* I have excluded group members with tied rankings for all their companions to avoid freak scores, as b_{max} is reduced to a quarter of its size when $t = n-1$.

popular member. The i^{th} group member will therefore be the person in the i^{th} position in the descending scale of popularity.

Let us denote the row-scores of the i^{th} member by the symbol R_{ij}, and his column-scores by C_{ij}.

His column-scores will consist of $(i-1)$ scores of value $(i-1)$, and $(n-i)$ scores of value i.

$$a_i = \sum_{j=1}^{n-1} C_{ij} = (i-1)^2 + (n-i)i = (n-1) + (n-2)(i-1)$$

Converting the a-score into an A-score,

$$A_i = 100\frac{i-1}{n-1}$$

$$\alpha_i = 100 - A_i = 100\frac{n-i}{n-1}$$

The sum of squared differences between the row- and column-scores of the i^{th} member is

$$b_i = \sum_{j=1}^{n-1} R_{ij}^2 + \sum_{j=1}^{n-1} C_{ij}^2 - 2\sum_{j=1}^{n-1} R_{ij}C_{ij}$$

We know that

$$\sum_{j=1}^{n-1} R_{ij}^2 = \tfrac{1}{6}n(n-1)(2n-1)$$

$$\sum_{j=1}^{n-1} C_{ij}^2 = (i-1)^3 + (n-i)i^2$$

and

$$\sum_{j=1}^{n-1} R_{ij}C_{ij} = \tfrac{1}{2}i\Big[n(n-1) - (i-1)\Big]$$

Therefore

$$b_i = \tfrac{1}{6}n(n-1)(2n-1) - 1 + (n-2)i^2 - (n+1)(n-2)i$$

Converting this b_i-score into a B_i-score, we obtain

$$B_i = \frac{50}{n(n-1)}\Big[2n^2 + n + 3 + 6i^2 - 6(n+1)i\Big]$$

$$\beta_i = 100 - B_i = \frac{-150}{n(n-1)}\Big[n + 1 + 2i^2 - 2(n+1)i\Big]$$

Combining the formulae for B_i and A_i, we arrive at a formula expressing the artefact relationship between Love-Hate Mutuality and Public Popularity.

$$B_i = \frac{3(n-1)}{100n}A_i^2 - \frac{3(n-1)}{n}A_i + \frac{50(2n-3)}{n}$$

Similarly, with regard to β- and α-scores,

$$\beta_i=\frac{-3(n-1)}{100n}\alpha_i^2+\frac{3(n-1)}{n}\alpha_i+\frac{150}{n}$$

These formulae demonstrate that a curvilinear artefact relationship in the shape of a parabola exists between Love-Hate Mutuality and Public Popularity.

In order to calculate the product-moment correlation coefficient between the two variables in the popular half of the curve we have to establish the sums (extending from $i=1$ to $i=\frac{1}{2}n$) of the following scores: A_i, A_i^2, B_i, B_i^2, and B_iA_i.

The sum of A_i-scores is

$$\sum_{i=1}^{\frac{1}{2}n}A_i=\frac{100}{n-1}\sum_{i=1}^{\frac{1}{2}n}(i-1)=\frac{25n(n-2)}{2(n-1)}$$

The sum of A_i^2-scores is found to be

$$\sum_{i=1}^{\frac{1}{2}n}A_i^2=\frac{100^2n(n-2)}{24(n-1)}$$

Expressing A-scores as deviations from the mean,

$$\sum_{i=1}^{\frac{1}{2}n}A_i^2-\frac{2}{n}\left(\sum_{i=1}^{\frac{1}{2}n}A_i\right)^2=\frac{50^2n(n^2-4)}{24(n-1)^2}$$

The variance of the A-scores (and also of α-scores) in the popular half of the distribution is therefore

$$\sigma_A^2=\frac{50^2(n^2-4)}{12(n-1)^2}$$

The sum of B_i-scores is found to be

$$\sum_{i=1}^{\frac{1}{2}n}B_i=25(n-1)$$

To obtain the sum of the B_i^2-scores, rather lengthy algebraic calculations are required which eventually lead to the result

$$\sum_{i=1}^{\frac{1}{2}n}B_i^2=\frac{250}{n(n-1)}(6n^3-14n^2+11n-9)$$

Expressing B-scores as deviations from the mean,

$$\sum_{i=1}^{\frac{1}{2}n}B_i^2-\frac{2}{n}\left(\sum_{i=1}^{\frac{1}{2}n}B_i\right)^2=250\frac{(n+1)(n^2-4)}{n(n-1)}$$

The variance of the B-scores (and also of β-scores) in the popular half of the distribution is therefore

$$\sigma_B^2=500\frac{(n+1)(n^2-4)}{n^2(n-1)}$$

To find the sum of the cross-products B_iA_i a somewhat lengthy algebra is again required. The formula is found to be

$$\sum_{i=1}^{\frac{1}{2}n} B_iA_i = \frac{50^2(n-2)}{16(n-1)^2}(3n^2-10n+4)$$

Expressing this as measured from the means of B and A, yields

$$-\frac{50^2n(n^2-4)}{16(n-1)^2}$$

We can now finally calculate the correlation coefficient and we obtain

$$r = -\sqrt{\frac{15n^2}{16(n^2-1)}} = -.968\sqrt{\frac{n^2}{n^2-1}}$$

The correlation coefficient between the two variables in the unpopular half is of the same size, but of positive sign.

BIOGRAPHICAL NOTE

A note on the author of this paper appeared at the end of Part I of the paper, in *Human Relations*, Vol. VII, No. 4, 1954.

GROUP BEHAVIOR UNDER STRESS [1, 2]

JOHN T. LANZETTA

The primary aim of this study was to investigate the effects of situational stress on the behavior of individuals interacting in small groups. Motivation, as an independent variable, was also introduced because it was felt its interaction with stress was not thoroughly understood and because, on a priori grounds, it seemed that the effects of stress on problem-solving behavior would be a function of the motivation of the group.

Rosenzweig, in his attempt to conceptualize reactions to frustration (21), called specific attention to the necessity for including a consideration of the defense reactions of social groups for an adequate account of these adjustive mechanisms. Since that time the effects of stress on social groups have assumed increasing practical importance as a result of work done by social scientists during World War II. The data collected by the Research Branch, Information and Educational Division of the Army, as reported in the *American Soldier* series (23), indicated the importance of stress as a determiner of attitudes, morale, and group efficiency, while the work of Grinker and Speigel (11) documented the effects of stress on combat performance and motivation. This work, as well as much unsystematized observation, implies that one of the possible variables affecting a person's reaction to stress is the presence of other individuals with whom he must interact in the performance of some common task. If this is so, the effects of stress on individuals in groups will differ from the effect of stress on individuals in an "alone" situation.

Despite the apparent importance of this variable, an examination of the literature indicates that previous studies have centered attention on the behavior of individuals working alone or co-acting. These studies of the

1. The work described in this paper was done under a contract between the U.S. Navy, Office of Naval Research, and the University of Rochester. Dr. Launor Carter was the responsible investigator.

2. The paper is based on a thesis submitted to the University of Rochester in 1952. Grateful acknowledgment is due to Dr. Launor Carter, who advised in all phases of the research, and to Dr. Beatrice Shriver and Dr. William Haythorn, who served as observers and were a constant source of aid throughout the study.

effects of stress on emotional (24, 22), cognitive (20, 9), and performance (16, 25) aspects of behavior are a possible source of valuable tentative hypotheses in the investigation of group behavior. However, hypotheses deduced from this work can only be held tenuously, since it is fairly well established that the behavior of one member of a group is to some degree a function of the behavior of other group members (23, 14).

To the author's knowledge there is only one experimental study of the behavior of interacting individuals under what could be called "stress" conditions. This excellent experiment by French (11) is an exploratory study of the dynamics of group behavior in strongly emotional situations. It differs from the present investigation primarily in that it does not concern itself with changes in dynamics within the same group under "stress" and control conditions.

The present study can thus contribute to the growing body of empirical knowledge about the functioning of small groups, as well as shed light on the experimentally neglected area of stress and interpersonal relations.

PROBLEM

Primary interest was focused on studying the effects of situational stress on the behaviour of individuals interacting in small groups under two levels of motivation. The concern was with the effects stress might have on the interaction of group members as they attempt to work cooperatively on a group task—effects not only on interactions of members with each other, but of members with the task materials. The emphasis was on both social-emotional and problem-solving behavior. In addition we attempted to investigate particular group properties (e.g., morale, cohesiveness) as they were affected by stress; properties which are probably the synthesis of certain interaction patterns but which we find difficult to describe in terms of interactions alone.

It seemed necessary because of the lack of pertinent data to consider the present study an exploratory one, and as such it demanded a rather comprehensive experimental technique. The methodology utilized was patterned directly after that used by Carter *et al.* (6), and can be considered as yielding data at three descriptive levels:

(a) group properties (e.g., cohesiveness)
(b) interaction patterns (e.g., agreeing, disagreeing behaviors)
(c) individual characteristics (e.g., striving for group recognition, leadership)

These levels are essentially those Cattell advances (8). He argues that groups can be described at three levels: (a) syntality, or the behavior of the group *per se* (group properties), (b) internal structural arrangements or relation-

ships of parts (patterning of interactions), and (c) characteristics of the average member of the population (averaged individual characteristics).

METHOD

The basic method used was that employed by Carter *et al.* in their studies of small groups, as reported in a series of papers (3, 4, 6, 7). Groups composed of four subjects worked on two types of tasks in a laboratory setting. The subjects were observed by two separated observers who immediately classified their ongoing behavior in terms of a large number of categories, and after each task rated each subject on a number of traits. After completion of the two tasks, both the observers and the subjects rated the group on a series of group characteristics.

The two tasks used, a Reasoning, and a Mechanical Assembly task, are described in detail elsewhere (6, 15). They represent the tasks which had high loadings in a factor analysis of leadership ratings on a series of six tasks, as reported by Carter (3). His results indicate: ". . . that each individual has certain abilities which, related to a particular task, are unique and enable him to fulfil leadership functions as the group attempts to accomplish the task. While each person may have some amount of 'general leadership ability' it is clear that his leadership ability is to a large extent relative to the task" (3, p. 153).

Since leadership is a variable with which we were concerned, it was thought best to use the two representative tasks.

The Experimental Situations

The two independent variables in this investigation were imposed stress and motivation. Three stress and two motivating conditions were used, i.e., an attempt was made to create three experimental stress atmospheres and two experimental motivating atmospheres for the purpose of inducing in the subjects a perception of varying degrees of stress and motivation. Checks on the adequacy of the experimental atmospheres were afforded by the recording of criteria behaviors (tension indicators and signs of frustration) and by a rating on the motivation of the group by the observers and the subjects. A description of the experimental atmospheres follows:

Stress. An attempt was made to create a non-stressful atmosphere, a mildly stressful atmosphere, and a fairly high stress atmosphere.

The non-stress (NS) situation was comparable to the situations used in previous studies by Carter *et al.* (6). The subjects were brought into the situation and shown the materials for the tasks. They were informed that we were interested in observing how groups interact while performing certain types of task, and then told to proceed. No mention was made of how long we expected the tasks to take or how well they were expected to perform them. The only stresses that would appear to exist in such a situation are

those which are inherent in any experimental situation that is unfamiliar and requires face to face contact with comparative strangers.

The mildly stressful (MS) situation was essentially the same as the above with the addition of a time limit for performance of the tasks. To make the time barrier more prominent the time remaining for completion of the task was called off to the subjects every five minutes, until only five minutes remained. In the last five minutes time remaining was told to the subjects at one minute intervals. Time limitations have served as stressful conditions in assessment work done during World War II (19), and by Lindsley (16) and McKinney (17) in experiments. All found that it served effectively to produce frustrating reactions.

The high stress (HS) situation consisted of the above procedure, time limitations, plus the addition of other barriers. For the reasoning task the additional stress was imposed by:

(a) informing the subjects when a conclusion reached was in error. The informing was done over a loudspeaker, the experimenter being in a separate room. This tended to make the time barrier more prominent since subjects were not allowed to rush through the task, coming to many false conclusions.

(b) the experimenter continually offered comments over the loudspeaker to the effect that the group was rather stupid, that the items were extremely easy and they should be doing much better on them, that "X" minutes had passed and they were not accomplishing much, and that the experimenter was surprised that they were having difficulty since he felt these items to be extremely simple.

For the mechanical assembly task additional stress consisted of the same badgering as in (b) above. In addition:

(a) a barrier was imposed which thwarted completion of the task. The task was assembly of a bridge out of pre-cut and pre-drilled lumber. The subjects were asked to "use your imagination on this task since you are to visualize yourselves as a combat engineering team whose job is to build a bridge across this river (the river was two strips of tape on the floor). The side of the river you are on was orginally completely mined but a small area (this area was defined by two lights) has been cleared and you have only that space to work in." When subjects crossed into the mined area two photo tubes and accessory circuits tripped a relay causing a bell to sound rather loudly and they were told harshly by the experimenter, "You are in the mined area, move out of it immediately." Initially, the subjects were informed that ". . . on the basis of present information from intelligence headquarters the enemy is sufficient distance away to allow you about 20 minutes to build the bridge across the river." After 10 minutes had elapsed, however, they were told that new information showed the enemy to be much closer than was thought, and they would have only 5 more minutes in which to work. The work space to which they were confined was extremely small, being barely larger than the largest pieces of lumber for the task, and

manipulating materials and constructing were extremely difficult inside the barriers. Every time a barrier was violated they were harshly reprimanded and made to move back into the work area. In addition, as was mentioned above, they were continually reminded of the remaining time and badgered as to their stupidity, slowness, and lack of ability.

The addition of time barriers conformed to Rosenzweig's definition (21) of a passive external stress, in that no threat to the organism was produced. The badgering technique, the implications of inadequacy, seems to conform to Rosenzweig's definition of an active external stress in that it is threatening to the group. A further justification for assuming the badgering to be stressful is that the technique was used effectively by Bruner and Postman (20) in creating stress.

Motivation. For the low motivation groups the subjects were paid at an hourly rate. No group or individual prizes for performance were offered, and no mention was made of a desire for good performance. The subjects were simply given the tasks, told that our interest was in group interaction, and asked to begin.

For the high motivation groups the subjects were also paid at an hourly rate, but in addition a twenty dollar prize was offered for the best performing group. Every effort was made on the part of the experimenter to increase the competition between the groups and to motivate them to perform well. They were told, "We are extremely interested in seeing how well groups can perform on certain types of tasks. It is very essential that you try to do your best. To help interest you in doing your best a group prize is being offered based on the performance of the group." Group performance records were posted in terms of the relative ranking of the group. In order to prevent actual performance records becoming a variable, all performing groups for each situation were always placed in a constant-relationship to the other groups, i.e., the particular group being observed was always ranked second among the groups.

Comments by experimental groups indicated that at no time did they become aware of the arbitrary nature of the rankings.

Experimental Design

The subjects were 48 volunteers from the junior class in the Naval Reserve Officer Training Corps program. Each subject served approximately six hours and was paid at an hourly rate. The 48 subjects were randomly divided into 12 groups of four members each, and these 12 groups were then randomly divided into two classes of six groups each. One of these classes was randomly assigned to the high motivation condition; the other became the low motivation class.

Within each of the motivation classes a modified latin square design was applied. Each of the six groups within a class received the three stress situations in a different order, the six possible orderings being used. The design

controlled the order of presentation of the situations, but because replication of each design was not feasible no test of significance of the effect of ordering was possible.

Instruments

We were interested in a total behavioral approach; one which would enable us to give a detailed description of the actual behavior of group members and to allow definitive statements regarding the activities of one member relative to others. Such an approach is possible through the recording of ongoing behavior in terms of small behavior units. Recent efforts in the application of such techniques are represented by the work of Bales (1), Bales and Gerbrands (2), Guetzkow (13) and others. The technique used in this study has recently been developed by Carter *et al.*, and is described in detail elsewhere (5).

While the subjects were working on the tasks they were observed through one-way vision mirrors by two independent observers, who classified their behavior in terms of a coding system involving 58 categories. At the completion of each task the observers rated each of the subjects, using a seven point rating scale, on 11 characteristics. The ratings included such characteristics as aggressiveness, confidence, etc. The reliability of the ratings and categorizations was generally adequate and has been fully presented in a previous article (6).

In addition, when the group completed both tasks it was rated, using a five point scale, on 11 variables by both the two observers and all members of the group. These variables were mainly concerned with group dimensions, i.e., such as morale, cohesiveness, productivity, etc. Previous studies (14) have shown that such characteristics can be rated with adequate reliability.

RESULTS

The data will be presented in terms of measuring instruments used, and in a subsequent section an attempt will be made to organize the data.

Criterion Data

Two methods were used in an attempt to permit generalization from this study to other studies of stress. First, the operations which defined our concept stress, were chosen from the procedures used by other experimenters to create a stress atmosphere. Secondly, attempts were made to record some behaviors which previously have been found to result from the imposition of stress. These criteria behaviors were recorded in two categories labelled respectively, tension indicators and expressions of frustration. The definitions of these two categories were mainly derived from Bales (1).

(a) tension indicators—any indication or manifestation to the observer

that the subject is on edge, keyed-up, agitated. The manifestation of "nervous habits"—fiddling, doodling, biting nails. Hesitation in speech, trembling, blushing, flushing, blocking, wetting lips persistently.

(b) expressions of frustration—any indication to the observer that the subject feels thwarted or deprived, dissatisfied, discontented, displeased. Any indication that the subject is disconsolate, downcast, despairing, resigned, or brooding.

To determine an index of "Reaction to Stress" for a group, the categories for the four subjects were summed for each observer, and the average of the two observers' totals was computed. The inter-observer reliability of the summed categories over all stress and motivating conditions, and for the two tasks, was ·87.

To test the extent to which groups under various stress conditions differentially exhibited such behavior, students' small sample "t" test technique was utilized (18, pp. 216–229). Since the same groups were exposed to all the stress conditions, the difference technique was employed to correct for non-independence of samples (18, p. 225). In *Table 1* the t's for the differences between the motivating conditions, by task, and for the stress conditions, by task, are presented. It should be noted that for the test of differences between motivating conditions no correction for non-independence was necessary. In this test the standard error of the mean difference was computed by the "pooled-variance" technique (18, p. 224).

Since none of the differences between motivating conditions was significant at the 5 per cent level of confidence, or better, the two motivating conditions were combined in testing the differences between stress conditions.

TABLE 1 *SIGNIFICANCE OF DIFFERENCES IN CRITERIA BEHAVIORS*

Task	*Motivation* (N=18)	*Stress* (N=12)*		
	LM *vs* HM	NS *vs* MS	NS *vs* HS	MS *vs* HS
Reasoning	Mean Diff.	−12·50	−2·08	−17·29	−14·88
	α_{Md}	7·6	1·60	3·15	3·55
	t	1·64	1·30	5·49‡	4·19‡
Mechanical Assembly	Mean Diff.	−5·94	−2·81	−20·75	−17·92
	α_{Md}	7·6	2·40	8·77	7·84
	t	n.s.	n.s.	2·37†	2·29†

* Since motivation was not significant the two motivation classes were combined, thus giving an N=12 for stress.
† Significant at ·02–·05 level.
‡ Significant at ·01 level or better.

It can be seen that there was a significant increase in the criteria behaviors for groups when under the high stress conditions, but a non-significant increase in these behaviors when under mild stress as compared to non-stress conditions. It is possible that the criteria behaviors selected were too severe. It might be that mild stress calls out more subtle expressions of tension

release than we allowed for. Or it is possible that the small number of groups used requires for significance a difference in frequency of such behaviors which cannot be expected unless the changes in stress are considerable. Whatever the source of such a lack of significance, when examining the main body of results we must bear in mind that it is possible that subjects did not experience frustration when exposed to the "atmosphere" we have labelled mild stress.

Interaction Categories

During each group session two observers continuously recorded the behavior of the group members in terms of 58 categories. For each motivation class of groups, therefore, there was available an interaction record for each of the tasks performed under each of the three stress conditions.

Because of the small number of units in some of the category cells it was decided to combine the categories into indices. The criteria for inclusion of a category into a broader index were based on both logical and empirical considerations. Carter, Haythorn, Meirowitz, and Lanzetta (6) indicate the relationship of several indices to ratings of behavior and also indicate the sensitivity of these indices to changes in task and size of group. Bales (1) has, by a process of logical deduction and empirical analysis, devised a system of interaction recording which utilizes only 12 categories. The indices utilized in this study are at about the level of abstraction of his categories.

The indices decided on were the following (the numbers refer to the numbers of the category in the recording system):

a. *Negative social-emotional behaviors*
   1. Aggressiveness or anger [1]
   2. Dissatisfaction [7]
   3. Negativism or rebelliousness [10]
   4. Defends self (or his proposals) from attack [28]
   5. Disagrees or skeptical [40]
   6. Argues with others [41]
   7. Contradicts or amends [42]
   8. Deflates others [43]

b. *Shows solidarity; agreeing, accepting behaviors*
   1. Attention or readiness [3]
   2. Status bestowing [8]
   3. Friendliness [9]
   4. Satisfaction or accomplishment [11]
   5. Supports proposal of another [30]
   6. Agrees or approves [31]
   7. Praises, commends, rewards [51]

c. *Self-oriented behaviors*

1. Superior status [12]
2. Calls for attention [21]
3. Proposes course of action for self [25]
4. Interrupts [45]
5. Performance of simple work unit—an independent effort [67]

d. *Job-oriented behaviors*

1. Supports or gives information regarding his proposal [27]
2. Gives information [32]
3. Answers questions [65]
4. Performance of simple work unit (group oriented) [66]

e. *Non-productive behaviors*

1. Meditates [70]
2. Listens, but does not enter in [72]
3. Engages in "out of field" activity, withdrawal [90]

f. *Equalitarian, group-oriented behaviors*

1. Cooperativeness [5]
2. Asks for expression of feeling or opinion [24]
3. Mediates, intercedes [56]
4. Collaborates with others [64]

g. *Initiating behaviors*

1. Asks for information or facts [22]
2. Diagnoses situation—makes interpretation [23]
3. Proposes course of action for others [26]
4. Initiates action towards solving problem [29]
5. Shows insight [33]
6. Gives information on how to carry out action [50]
7. Expresses a desire that something be done [52]
8. Asks for assistance for others [53]
9. Asks for assistance for self [54]
10. Integrates group behavior [55]
11. Repeats or clarifies [57]

h. *Directing behaviors*

1. Tells someone to do something [20]
2. Gives bold command or prohibits [44]

i. *Submissive behaviors*

1. Deference [6]
2. Concedes to the point of another [37]
3. Follows suggestions or direction [60]

In addition to the above indices, categories 23, 29, 26, and 34 were analysed singly. The first three are included together in the index of initiating behaviors, but it was felt that their importance warranted a separate analysis also. Category 34, "general discussion regarding task", seemed as though it would be a good indicator of interest and concern with job completion. These four single categories and the nine indices were all that were used in all further analysis.

Table 2 shows the percentage distribution of combined categories of behavior by motivation, by task, for the three stress conditions. The percentages are believed to be very stable; the number of units upon which they are based being quite large (varying from 3,319 to 4,510 per task). It will be noted that there is considerably more of some kinds of behavior recorded than others. Most of this difference is almost certainly a reflection of the problem-solving nature of the situations and the composition of the groups, but some of it is probably a result of the differential difficulty of observing various kinds of behavior. The initiating, problem-directed activity is usually central in the field, while the non-productive, self-oriented acts are in the periphery. The observers' attention is necessarily focused on the area of greatest activity, where most of the group is concentrated, on the individuals communicating at a particular moment, etc. This is the area where the initiating, problem-solving job-oriented acts are occurring. The small number of directing and submissive behaviors is understandable when it is realized that these are "peer" groups. It is almost certain that groups composed of high and low formal status members would show more of such behaviors.

TABLE 2 *PERCENTAGE DISTRIBUTION* OF BEHAVIOR INDEXES BY MOTIVATION, STRESS, AND TASK*

	Low Motivation						*High Motivation*					
	NS		MS		HS		NS		MS		HS	
	R	MA	R	MA	R	MA	R	MA	R	MA	R	MA
a. Negative Social-Emotional Beh.	3·5	2·0	3·3	1·8	2·7	1·6	4·4	3·1	2·8	2·8	3·3	1·3
b. Solidarity Beh.	8·1	6·7	8·7	6·2	6·2	6·3	7·2	6·1	7·3	5·6	6·9	5·1
c. Self-Oriented Beh.	3·1	3·7	3·2	4·7	2·5	2·1	2·8	2·7	3·1	3·9	2·1	1·7
d. Job-Oriented Beh.	32·6	32·3	32·8	34·0	34·9	27·6	31·9	28·9	31·8	33·3	31·0	25·9
e. Non-productive Beh.	3·1	7·7	4·8	10·9	2·8	8·2	3·3	8·9	3·9	5·9	4·5	8·4
f. Equalitarian-Group Oriented Beh.	1·5	9·0	1·0	10·5	1·3	16·5	1·3	7·7	1·4	11·7	1·2	13·6
g. Initiating-Problem Oriented Beh.	25·9	18·9	25·5	14·3	33·1	14·9	36·5	21·0	35·4	15·9	35·7	24·7
h. Directing Beh.	·6	1·4	·94	1·3	·76	2·2	1·0	2·1	1·0	1·7	·71	1·4
i. Submissive Beh.	1·1	2·9	·82	2·0	·59	2·9	·55	2·0	1·0	2·4	·79	1·8
Average Units Per Session	553	659	617	616	623	563	690	751	666	667	661	579

* Since not all categories are included the total does not equal 100%.

It is interesting to note the wide variation in types of behavior associated with the different tasks. The reasoning task seems to include about equal percentages of initiating and job-oriented behaviors. These two indices also account for over 60 per cent of the behavior acts recorded for this task. The mechanical assembly task includes almost twice as many job-oriented behaviors as initiating behaviors and the two indices combined account for about 50 per cent of the acts recorded. More diversified behavior is exemplified in the mechanical assembly task than in the reasoning task, as the percentage distributions over the indices indicate.

In order to determine whether some of the above cited differences in behavior as a function of the task, and also differences as a function of stress and motivation, were significant, analyses of variance were done for each of the indices. Since the data were based on independent as well as non-independent groups, a technique based on that suggested by Edwards (10) was employed.

Table 3 presents the results of such an analysis for five of the indices. For two of the indices an inspection of the average percentages indicated a non-linear relationship between stress and the amount of recorded behavior in the index. For self-oriented and job-oriented behaviors then, significance of the differences between conditions was determined by small sample "t" tests. For the stress and task variables the difference technique was used to correct for non-independence of groups, while for motivation the standard error of the mean was determined by the "pooled variance" technique. These t's are shown in *Table 4*. The percentage of recorded behavior for the non-productive, directing, and submissive indices, was too small for meaningful analysis to be attempted.

An inspection of the two tables indicates that for no index did motivation prove to be a significant variable. High motivation resulted in an overall increase in the number of acts performed, but this increase apparently was distributed fairly evenly over all the categories and did not result in increasing the number of behaviors of a particular kind.

TABLE 3 *TABLE OF F VALUES FOR BEHAVIOR INDICES*

Index	*Variable**		
	Motivation	*Stress*	*Task*
a. Negative Social-Emotional Behaviors	n.s.†	6·01†	16·41§
b. Solidarity-Agreeing, Accepting Behaviours	2·24	1·57	8·14‡
c. Equalitarian-Group Oriented Behaviors	n.s.	6·42§	183·40§
d. Initiating-Problem Oriented Behaviors	n.s.	8·86§	296·10§
e. General Discussion Regarding Task	n.s.	3·50‡	188·10§

* None of the interactions, M × S, M × T, S × T, were significant for any of the indices.
† n.s.—non-significant, by inspection.
‡ Significant at ·02–·05 level.
§ Significant at ·01 level or better.

TABLE 4 *SIGNIFICANCE TESTS OF DIFFERENCES IN SELF-ORIENTED AND JOB-ORIENTED BEHAVIOR FOR STRESS AND MOTIVATION*

Index		*Motivation* (N=18)	*Stress* (N=12)		
		LM *vs* HM	NS-MS	NS-HS	MS-HS
Self-Oriented Behaviors	Mean Diff.	·35	·33	2·90	3·23
	σ_{Md}	·50	·61	·85	·84
	t	n.s.	n.s.	3·41*	3·85*
Job-Oriented Behaviors	Mean Diff.	·38	·29	·35	·64
	σ_{Md}	·46	·34	·65	·63
	t	n.s.	n.s.	n.s.	n.s.

* Significant at ·01 level or better.

The significance associated with tasks for many of the indices reinforces the previously made observation that there are wide variations in behavior associated with various tasks. For the mechanical assembly task there were almost twice as many non-productive behaviors, over five times as many equalitarian, group-oriented behaviors, a larger number of both directing and submissive behaviors, and more group discussion regarding the tasks, than for reasoning. Reasoning showed a greater number of negative-social emotional behaviors, more solidarity-oriented behaviors, and more initiating and insightful behaviors.

Despite the significance of task as a variable affecting behavior, it apparently did not interact with stress to a significant extent. None of the task-times-stress interactions are significant, indicating that stress affects behavior similarly regardless of whether the group is working on an essentially intellectual or motor task. However, caution is necessary here. The wide variation in occurrence of certain behaviors associated with task may have no effect on the actual change in such behavior as stress increases, but because of infrequent occurrence such behavior changes may be overlooked by observers more easily in one task than another. For example, if interest is centred on the effect of stress on equalitarian, group-oriented behaviors, the mechanical assembly task would better indicate any changes, since over five times as many such behaviors are recorded for this task as for the reasoning task.

Motivation appears to interact with stress to a significant extent for two of the indices. No test of significance for such interactions can be made in these cases, because a non-linear relationship exists between the occurrence of the behaviors and stress. For these indices significance of the differences for the stress conditions was determined separately for the two motivating classes. As mentioned previously, these are shown in *Table 4*. For low motivation groups, non-productive behavior increases to a high point under mild stress and then drops to its non-stress level under high stress. Submissive

behaviors decrease to a low point under mild stress and then increase again, while directing behaviors show a monotonic increase. For high motivation groups non-productive behavior is lowest under mild stress and highest under non-stress and high stress conditions. Submissive behaviors increase to a high point under mild stress, while directing behaviors decrease monotonically. With all three variables, the relationship for high stress is the 180 degree projection of the relationship for low stress. For only one of these indices—non-productive behaviors—does the percentage falling within the index achieve any practical importance. For this reason very little significance can be attached to these changes.

All the other indices show no significant interaction of stress with motivation. For these variables, since neither task nor motivation interact with stress to a significant extent, the results can be generalized for the two tasks and the two motivating conditions. An inspection of *Tables 3* and *4* indicates that as stress increases:

a. negative-social emotional behaviors decrease
b. initiating behaviors decrease
c. "diagnosing situation and making interpretation" behavior decreases
d. equalitarian group-oriented behavior increases
e. general discussion regarding the task increases
f. self-oriented behavior decreases

These changes in behavior appear to fall into three classes, (a) changes in behavior which would tend to cause tension, friction, or disequilibrium in the group, (b) changes in behavior which would tend to cause a decrease in tension and an increase in harmony within the group, and (c) changes in problem-solving behavior. As stress increases there is a decrease in behaviors which are associated with internal friction in the group and a concomitant increase in behaviors which would tend to result in decreased friction and better integration of the group. For problem-solving behaviors there is a substitution under increased stress, of general, non-initiating, non-productive discussion of the task for a more positively initiating, insightful kind of behavior.

Ratings of the Group

Each group was rated after each session by observers and subjects on eleven variables concerned with group characteristics. The variables were talkativeness, morale, competition, cooperation, productivity, cohesiveness, motivation, friendliness, activity, interest in job completion, and concern with social interaction. Each of these characteristics was rated on a five point scale, the first, third and fifth points being defined. The reliabilities are not as high as would be desired, running from ·10 for job completion to ·83 for productivity. The average reliability is ·60. From these ratings we can obtain some information about how both the observers and the participants perceived the group under the various stress conditions.

The mean differences between ratings for motivation groups were tested for significance using the pooled variance technique. For stress, since the same group was exposed to all three stress conditions, the difference technique was used to test significance of differences. In those cases where significant differences existed between motivating conditions the differences for stress were tested for each motivating condition. Where motivation was not significant the differences between stress conditions were tested for the two motivating conditions combined.

A qualitative summary [3] of the results is shown in *Table 5*. In all cases the

TABLE 5 *SUMMARY OF RESULTS ON RATINGS OF GROUPS*

Variable	*Observers' Ratings*	*Participants' Ratings*
Talkativeness	HM groups more talkative†	HM groups more talkative
	Decrease, then increase under stress*	Decrease, then increase under stress†
Competition for Leadership	HM groups more competitive‡	No differences for motivation
	General tendency to decrease under stress*	General tendency to decrease under stress
Cooperation	No differences for motivation	No differences for motivation
	Increase under stress*	Increase under stress*
Friendliness	No differences for motivation	No differences for motivation
	Increase under stress†	Increase under stress†
Activity	No differences	No differences for motivation
		Increase, then decrease under stress*
Job Completion	HM more interested†	No differences
	No differences for stress	Increase interest under stress*
Social Interaction	No differences	No differences
Motivation	HM greater*	No differences for motivation
	No differences for stress	Increase, then decrease under stress*
Morale	No differences for motivation	No differences for motivation
	Increase, decrease under stress†	Increase, decrease under stress*
Productivity	No differences for motivation	No differences for motivation
	Increase, decrease under stress†	Decrease under stress‡
Cohesiveness	No differences for motivation	No differences
	Increase under stress†	
Pride in Group		Decrease under stress†
Teamwork and Cooperation		Increase under stress*
Attitude Toward Task		Decrease in favorableness under stress†

N = 12

* Significant at .10–.06 level.
† Significant at .05–.02 level.
‡ Significant at .01 level or better.

3. Because of limitations of space the reader is referred to (15) for the relevant data on which this summary is based.

statements refer to changes which took place over stress *as stress increased*, e.g., increase, decrease, would mean that the amount of the variable increased from non-stress to mild stress and then decreased under high stress again. Differences which were significant at the ten per cent level or better are included. It is recognized that the ten per cent level is not a stringent requirement, but it was felt that since we were looking for patterns, and no conclusions were to be based on variation in any single variable, it was justified. The level of significance of the cited differences are indicated in the table.

It can be seen from the summary that the variation of group characteristics with stress, as perceived by observers, falls into two classes. The first class of variables shows a curvilinear relationship with stress. As stress increases, productivity and morale increase and then decrease, while talkativeness decreases and then increases. High motivation groups also show first an increase and then a decrease in cohesiveness. The second class of variables shows a monotonic relationship with stress. As stress increases, competition for leadership decreases, while cooperation and friendliness increase. There are no significant changes in activity, social interaction, or interest in job completion.

Subjects perceived the same types of relationship of group characteristics to stress as observers. As stress increases subjects perceive activity, interest in job completion, motivation, and morale as increasing and then decreasing. They perceive that talkativeness decreases and then increases.

Other variables are monotonically related to stress. Competition for leadership decreases while friendliness increases. Productivity decreases, and low motivation groups perceive cohesiveness as decreasing. All the groups become less proud of their group, and their attitude toward the task decreases in favorableness.

The grouping of these variables shows some similarities to and many differences from those found for observers' ratings. The variables curvilinearly related to stress are all of such a nature as to lead one to expect the same curvilinear relationship between productivity and stress as is found for observers. Yet the subjects perceive productivity as decreasing as stress increases. This apparently contradictory result might be explained by assuming that, as stress increases, the desire of the group members for successful performance becomes intensified, and the group, although doing well, does not measure up to its increased expectations. This would be supported by the decreased pride that they felt in the group.

The groups, like the observers, also rate competition as decreasing and friendliness as increasing, but despite this they become less proud of their groups. A discussion of this point will be reserved until later.

In addition to these results relating group characteristics to changes in stress, there were differences between the motivation classes in regard to two of the variables. High motivation groups were rated by observers as being more highly motivated and more concerned with job completion than the

low motivation groups. Both of these results would be expected by the nature of the differential reward offered to the two classes of groups. They serve to support the a priori assumption that increasing the reward would increase the task involvement for the "high motivation" groups.

Ratings of Group Members

These ratings were concerned with the characteristics of individuals and were made by the observer for each subject, after each task, for the three stress sessions. The characteristics rated were cooperativeness, aggressiveness, initiative, prestige, confidence, submission, efficiency, sociability, insight, concern with individual solution, and authoritarianism. The summed ratings for these ten characteristics, by task and motivation, for non-stress and high stress are shown in *Table 6*.

TABLE 6 *RATINGS OF INDIVIDUALS SUMMED FOR NON-STRESS AND HIGH STRESS, BY MOTIVATION, AND BY TASK*

	Low Motivation				*High Motivation*			
	R		MA		R		MA	
Variable	NS	HS	NS	HS	NS	HS	NS	HS
Cooperation	156	143	129	120	150	141	135	124
Aggression	183	198	190	207	173	190	187	207
Initiative	156	163	152	139	153	154	158	143
Prestige	179	172	172	172	170	174	169	169
Confidence	171	196	152	172	162	195	155	159
Submission	207	214	208	212	212	205	214	205
Efficiency	166	191	153	161	170	187	180	148
Insight	159	184	164	170	166	187	183	171
Ind. Solution	168	184	168	190	150	167	162	197

N=24

Note: Low rating is high end of scale, e.g. for low motivation—reasoning, cooperativeness is greater under high stress.

Two things are immediately apparent upon inspection of this table. First is the fact that a large number of the characteristics show changes from non-stress to high stress. Secondly, it appears that the direction of change is the same regardless of motivation or task. In order to determine the significance of these changes, "t" tests were applied to the differences between the mean ratings, summed for motivation and task, under non-stress and high stress. Only those differences which on inspection appeared to be large enough for possible significance were tested. The results of the significance tests for these variables are shown in *Table 7*.

The difference between the mean ratings for aggression, confidence, and individual solution are all significant at the 5 per cent level or better. The differences for cooperation and insight do not reach significance. Since the

TABLE 7 *SIGNIFICANCE TESTS OF DIFFERENCES BETWEEN RATINGS OF INDIVIDUALS UNDER NON-STRESS AND HIGH STRESS*

Variable	*Mean Ratings* NS	HS	D_M	σ_{Dm}	t
Cooperativeness	5·94	5·50	·44	·28	1·57
Aggressiveness	7·63	8·35	−·72	·31	−2·32*
Confidence	6·67	7·52	−·85	·28	−3·04†
Insight	7·00	7·42	−·42	·29	−1·45
Ind. Solution	6·75	7·69	−·94	·37	−2·54†

N=96

Note: Low rating is high end of rating scale.
* significant at ·05–·02 level.
† significant at ·01 level or better.

low numbers are at the high end of the rating scale, the differences indicate that participants were less aggressive, less confident, and less oriented toward group solution under high stress.

DISCUSSION

The experimental techniques utilized resulted in data collection at three descriptive levels: those of group properties, interaction patterns, and individual characteristics. Not all the independent variables received equal attention on all three descriptive levels. The results for task are mainly based on interaction patterns, while those for motivation are based primarily on changes in group characteristics. Stress, the major independent variable, received considerable attention on all three descriptive levels. The discussion of results will be in terms of the three independent variables whenever feasible. Where there is interaction between task or motivation, and stress, the discussion of these results will be included with those for stress.

Stress

Attention will be directed to two main questions concerned with interpersonal relations and problem-solving behavior respectively, as they are affected by stress. No attempt will be made to discuss all the nuances of the data. It is felt that the methodology utilized is not sufficiently refined to allow conclusions to be drawn from any isolated correlation or test of significance. Therefore, only data which are supported by results obtained with other instruments, or data which integrate well into the total picture, will be discussed.

Interpersonal Relations Under Stress. Analysis of the interaction indices indicates that the behavior changes under stress could be considered to fall into three classes: (a) changes in behavior which would tend to cause tension,

friction, or disequilibrium in the group, (b) changes in behavior which would tend to cause a decrease in tension, and increased integration of the group, and (c) changes in problem-solving behavior. The first two certainly reflect a change in interpersonal relations. It was found that as stress increased there was a decrease in behaviors associated with internal friction in the group; a decrease in the number of disagreements, arguments, aggressions, deflations and other negative social-emotional behaviors, as well as a decrease in self-oriented behaviors. Concomitant with this decrease was an increase in behaviors which would tend to result in decreased friction and better integration of the group; an increase in collaborating, mediating, cooperating behaviors. Apparently, as stress increases, individuals attempt to keep interpersonal tensions at a low level, substituting positive, group-oriented behaviors for negative, individually-oriented behaviors.

These changes in behavior should result in changes in characteristics of the group as perceived by both observers and subjects. The analysis of the ratings of group characteristics indicates that both observers and participants saw the groups as less competitive, more cooperative, and more friendly under increased stress. These changes are almost certainly a reflection of the changes in behavior noted above, and they indicate decreasing friction and tension within the group, and increasing internal harmony.

The data from still another source, the ratings of individual characteristics, lend more support to this finding. Individuals were rated as being more cooperative, less aggressive, less oriented toward individual solution, and less confident under high stress than under non-stress. The first three changes can be interpreted as leading to a decrease in friction and an increase in harmony within the group, while the fourth gives a clue as to why such changes might have occurred.

It can be said then, that under increased stress members of a group show more behavior which tends to reduce interpersonal tension and friction and less behavior which might lead to increased disharmony. They will become less argumentative and aggressive, and more cooperative and friendly. It is conceivable that in the face of the external stress and increasing anxiety the group members perceive the group to be a source of security and thus attempt to maintain their position in it and prevent rejection by more cooperative and friendly behavior. That the group members do become less confident, and probably more anxious, is supported by the decrease in the self-confidence ratings made by observers.

The majority of the studies on stress have been concerned with the performance of individuals in non-group situations, and in general they find that stress leads to the typical reactions of: (a) aggression, (b) withdrawal or escape behavior, (c) regression, (d) neurotic symptoms, etc. They also find that the strength or degree of the above reactions is positively related to the degree of stress. Therefore, these rather negative emotional behaviors should increase as stress increases. We find the opposite occurring.

Some incidental observations made on the groups may shed some light on this apparent discrepancy. It will be recalled that the order of exposure of a group to high stress was varied systematically, some groups receiving high stress on the first session. It was noted that groups receiving stress at their first session were much more recalcitrant about returning for further sessions than the groups which had worked under non-stress. On the average about 30 per cent more cancellations were received from "high stress on first session" groups. It was also apparent that individuals in these groups were more often late for the next session, and when they arrived were often sullen and irritable with the experimenter. Finally, it may be said that no aggression against the experimenter was recorded for the non-stress sessions, whereas some aggression against the experimenter occurred under the stress conditions, although the frequency was so low that no analysis could be attempted.

All the above can be interpreted as manifestations of aggression, withdrawal, or escape behavior with regard to the experimental situation. This would be in agreement with the literature since in almost all the reported studies the behavior noted, in fact the only behavior possible, was a reflection of the interaction between the subject and the experimental conditions, or the experimenter, *both probably being associated with the imposed stress.*

Wright (24), in a study of the influence of frustration upon the social relations of young children, found essentially similar results. He reports that, "There was a significant increase in the cohesiveness of the groups under the influence of frustration. The amount of time spent in cooperative behavior significantly increased, and time spent in conflict behavior decreased" (24, p. 121). This change in inter-child social emotional behavior was accompanied by a marked change in attitude toward the experimenter. The predominantly friendly attitude in the free play situation changed to one of considerable hostility in the frustrating situation.

Both Wright's and the present study seem to indicate that where the stimuli are perceived to be associated with the imposed stress the subjects react in a fashion predictable from previous experiments on individuals, but where the stimuli (other individuals) are not associated with the imposed stress and are in fact probably perceived as supports in facing this threat, the behavior is the opposite of what would be predicted.

This increase in integrative behavior is by no means a unique observation. It coincides, more or less, with the layman's observation that disaster sometimes leads to decreased bickering and increased integration of group members, in families, athletic teams, cities, or nations.

Problem-Solving Behavior Under Stress. We include in our discussion of problem-solving not only behaviors which are considered to be directly related to solution of the problems, but also those characteristics of the group which are probably interrelated with or resultant from such behaviors.

From the interaction categories it was noted that under increased stress

there was a decrease in initiating behaviors, mainly in terms of "diagnoses situation, makes interpretation" kinds of behavior, and an increase in a more "general discussion of the task" kind of behavior. In the light of the recorded increase in equalitarian, group-oriented behaviors, these changes probably reflect a more democratic, less individually-oriented approach to solution rather than a more disorganized, less efficient approach. This would also be supported by the observers' ratings of group and individual characteristics. They rated productivity, efficiency, and morale as being highest under mild stress and about the same under non-stress and high stress conditions, while talkativeness was rated lowest under mild stress. These results would indicate that the problem-solving performance of the groups was best under mild stress and about equal under non-stress and high stress.

The subjects did not perceive the situation in this way. They rated productivity as similar under non-stress and mild stress, and lower under high stress, although their other ratings are inconsistent with this. Activity, interest in job completion, motivation, and morale are all perceived to be highest under mild stress and about the same under the other two stress conditions. These characteristics would presumably be highly related to the productivity of the group, and would lead one to believe that perceived productivity would also be highest under mild stress. It is possible that this apparent discrepancy is simply a reflection of a change in ego-involvement and level of aspiration of the group members. If one assumes that level of aspiration increases monotonically as stress increases, then one would expect the above co-variations to occur. Under non-stress, although the group does not see itself as especially active, motivated, interested in job completion, or with very high morale, its low level of aspiration would still lead it to perceive productivity as adequate. Under mild stress even though activity, motivation, etc., are felt to be high, the increased level of aspiration would result in no increase in perceived productivity, *even if productivity were actually higher.* Then under high stress, with activity, motivation, etc., perceived to be at about the non-stress level, the high aspiration level would result in a much lower rating of productivity. That such a change in ego-involvement and level of aspiration is probably occurring is supported by the participants' ratings of "pride in group" and attitude towards the situation. It would be expected that with increased level of aspiration and concomitant decreased productivity, the "failure" experienced would become more acute, and satisfaction with the situation would decrease. The ratings indicate that the subjects felt less pride in their groups and also had an increasingly less favorable attitude toward the situation as stress increased.

Motivation

Differences between the two classes of motivated groups appeared on only a few of the variables. Observers rated the high motivation groups as slightly more motivated and more concerned with job completion than the

low motivation groups. There were no significant differences on any of the other group characteristic variables and no differences on any of the interaction indices.

Task

There were quite striking behavior differences associated with the two tasks. For the mechanical assembly task there were almost twice as many nonproductive behaviors, over five times as many equalitarian, group-oriented behaviors, a larger number of both directing and submissive behaviors, and more group discussion regarding the task, than for the reasoning task. The reasoning task showed a greater number of negative-social emotional behaviors, more solidarity-oriented behaviors, and more initiating and insightful behaviors.

These results support the previously reported finding by Carter *et al.* (6), that the reasoning task includes more initiating activity with emphasis on making diagnosis, while the mechanical assembly task involves much less behavior devoted to initiating action, but much more to action by the "followers" or "workers".

It should be pointed out that the above discussion is relevant to a rather limited population, working on rather specific tasks. Whether such results can be generalized to most small groups is a matter for future research to determine. Even with such limited generality the results have some interesting implications. They suggest that the results of previous work on stress were a function of the restricted range of behavior allowable to the subjects. If other individuals, not associated with the imposition of stress, were placed in the field, aggressive behavior, withdrawal, etc., might not occur. These other individuals might be perceived as a source of security, and might be reacted to in a more positive fashion. The results also suggest that stress may not always be detrimental to performance, that in fact a certain amount of stress may actually facilitate good performance, although those experiencing the stress may not perceive the facilitation.

SUMMARY

Twelve groups, each composed of four Naval Reserve Officer Trainees, were exposed to three experimental conditions varying along a "stress" dimension. The twelve groups were randomly divided into two classes of six groups each, one class, termed "high motivation", being rewarded with a group prize for the best performing group, the other class, termed "low motivation", being offered no reward. Within each of these classes, each group was exposed to the three experimental stress conditions in a different order, there being six possible orderings. The three experimental conditions were:

non-stress—subjects were given no special instructions; they were given

the task materials, and told only that we were interested in how groups go about solving problems.

mild stress—a time limit was imposed and reinforced by the announcement, at intervals, of time remaining.

high stress—a time limit was imposed, the subjects were badgered and belittled by the experimenter and there was a restriction of work space.

At each session the groups worked on a reasoning and mechanical assembly task. An attempt was made to collect extensive data on the social-emotional and problem-solving behavior of the group members. Techniques used were: (a) continuous on-going recording of behavior, by two observers, in terms of 58 categories, (b) ratings, made by the two observers, of each individual after each task, for each session, on twelve characteristics, (c) ratings of eleven group characteristics by both observers and participants.

All three independent variables, stress, motivation, and task, affected behavior, but there appeared to be little interaction between them. Quantitative comparisons indicated that changes in behavior under stress could be classified into three categories: (a) changes in behaviors which would tend to increase interpersonal tension and friction within the groups, (b) changes in behaviors which would tend to decrease interpersonal tension and increase integration, (c) changes in problem-solving behavior. There was a decrease in negative-social emotional behaviors, in aggressions, deflations, dissatisfactions, competition, etc., and in self-oriented behaviors, under increased stress. There was an increase in positive, group-oriented behaviors such as cooperativeness, friendliness, group discussion, integrating acts, etc., under increased stress. These were interpreted as indicating that participants perceived the group as a source of security in the face of the external threat, and thus behavior which would lead to acceptance by the group was facilitated, while behavior which might lead to rejection was depressed.

Analysis of characteristics and behaviors related to performance indicated that the performance of the group was best under mild stress conditions, the relations of performance to stress being curvilinear. Participants did not perceive performance improving, although a similar curvilinear relationship obtained between their ratings of activity, motivation, morale, and interest in job completion. The inconsistency between observers' and participants' ratings could be explained by assuming a linear increase in level of aspiration as stress increased.

The results for motivation gave some indication of an interaction effect with stress, but the changes were small and insignificant.

Task was an important variable influencing behavior, but its interaction with stress was at no times significant. In general the results for tasks support previously reported findings that there are marked differences in the behavior of groups depending on the activity in which they are engaged.

It has been pointed out that the results of this exploratory study are limited in generality, since the experiment was performed on a selected

sample of college males, working in cooperative groups, on a limited sampling of tasks.

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BIOGRAPHICAL NOTE

A note on the author of this paper appeared in *Human Relations*, Vol. IV, No. 3.

SOME PROBLEMS OF METHOD IN EXPERIMENTAL GROUP PSYCHOLOGY

Considerations Arising from Cross-cultural Experiments on Threat and Rejection[1]

CECILY DE MONCHAUX AND SYLVIA SHIMMIN

In a previous paper (5), a series of collaborative studies was reported, the aim of which was to examine the behaviour of small groups of adolescents under various experimental conditions and in a number of western European countries.

While the replication of the experiment in the seven different countries has not afforded us many clear-cut findings either as regards cross-cultural differences or the effects of the main variables, nevertheless many methodological skeletons have been laid bare in our attempts at post-mortem. Since the experiment was similar in design to a number of other recent studies in the Lewinian tradition, we feel that the conclusions we have drawn may be of some general application in the experimental study of small groups. Of the seven sets of results (Norwegian, Swedish, French, Dutch, German, Belgian and English) the English findings were most at variance, and so provide the most striking illustration of some of the general methodological problems we encountered in the project as a whole.

First, to recapitulate in brief the plan of the experiment which was previously described in detail (5): the study was devised to reproduce, under controlled conditions, a social situation familiar in everyday life: one in which a group of persons attempts to arrive at a common decision in the face of individual differences of opinion within the group. It was thus an experimental prototype of the situation often found in committees, juries,

1. The experiments were carried out under the auspices of the Organization for Comparative Social Research, with the support of a grant from the Ford Foundation. The English study was made in the Psychology Department, University College, London, by the authors with the help of Kenneth Miller, Godfrey Gardner and Brian Allt.

etc. The central problem was to study the way in which a divergence from group opinion can lead to the development of negative attitudes towards a dissenter. Boys' Aviation Clubs were set up, and during a first meeting, the members were asked to make a decision as to which one of five possible model planes should be built by the club, as its entry in a model plane competition. The conditions of the actual discussion period were held constant for all groups, but the context of the discussion varied according to: (i) the reward offered to the club for success in the competition, and (ii) the relative chances of success or failure expected by the club. The experimenter attempted to make sure that a divergence from group opinion would occur by including as a member of each group one boy ("stooge") who had been coached by the experimenter to maintain a consistent choice in favour of the least attractive model plane.

To use the Lewinian metaphor, the discussion as to which plane to build represented the *path* towards a group goal. For any given group, this goal was of one of two levels of *valence* and subject to one of two strengths of barrier. From the combination of *valence* and *barrier*, four experimental conditions were obtained, as follows:

Goal valence	*Probability of success in reaching goal*
High (Success in competition meant that club would continue)	High (Members told that 22/25 clubs likely to succeed)
Low (Success in competition meant that club would acquire film tickets)	Low (Members told that 5/25 clubs likely to succeed)

Each group, therefore, could be thought of as having an *inner* barrier (or threat) in the form of a member who deviated from the majority opinion, and an *outer* barrier (or threat) imposed by differences in the likelihood of success. In these terms our problem might be restated as follows: how far is response to the inner barrier (represented by failure to reach a unanimous decision) mediated by the value of the group goal (type of reward offered), and by the strength of the outer barrier (chances of success or failure)?

The dependent variables selected for study were of two kinds: (i) an analysis of the communication pattern in each group, during the process of making a decision (individual changes in opinion, attempts at persuasion, differential treatment of the deviate), and (ii) tests of interpersonal attitudes between group members at the close of the meeting (preferences with regard to working companions and election of club captain).

It was our aim to establish a social situation which would be at the same time realistic and controlled. This was attempted by: (i) ensuring certain constant conditions for the discussions (that the group members should hitherto not have known one another, that during the discussion a situation

should arise where the members would perceive themselves to be unanimously opposed to the opinion of a single dissenter); (ii) determining whether the variations in "goal valence" and "probability of success" were in fact experienced as such by the subjects.

How far are such controls compatible with realism? How can we be sure that we have succeeded in bringing about social situations which are subjectively equivalent for each group? The advantages gained in using an experimental and controlled approach rather than the observation of "natural" social events are frequently offset by the extent to which the experimental controls themselves distort and interfere with the facts under investigation. These secondary effects of experimentation are often difficult to isolate and detect, but in the present investigation we had a unique opportunity to observe them, for the reason that they varied considerably from country to country. In the following pages, we discuss some examples of these problems as we encountered them in carrying out the experiments in London.

THE ESTABLISHMENT OF CONSTANT CONDITIONS

a. *Relationship between Group Members*

In the attempt to reduce the number of unknowns in an inevitably complicated experiment, the groups were composed of boys who had no previous acquaintance with one another. Such "neonate" groups have often been used in studies of small group behaviour, but although they have the advantage of simplifying the structure of the groups being observed, there are a number of respects in which the situation is actually made more complex for the experimenter. Far from providing him with the lowest common denominator of group life, the neonate group may be a unique and not necessarily representative example of group phenomena, namely, that of the group of strangers testing one another out. Further, the rather natural suspicion of subjects in a new and often ambiguous social situation makes it very difficult for the experimenter to establish the relationship of trust with his subjects which is fundamental to reliability of results. Thus in the present case, one may wonder how far the few indications of any marked unpopularity or rejection of the deviate were due to a hesitation on the part of subjects to commit themselves strongly against a stranger.

In England, although the boys' interest in joining the aviation club was high, their previous experience of club membership seems to have produced a number of special difficulties. In urban areas in England a very high proportion of school children belong to some out-of-school club, and by the time they reach adolescence, most children are well used to club and group procedures. Our subjects, therefore, found it difficult to accept as real a number of features of the experimental setting. For instance, they did not like coming to meetings alone, but wanted to bring friends with them; they were suspicious that the clubs were free, and were used to a show of hands

rather than written voting procedures. Moreover, their sophistication in the ways of group conduct led them to find many solutions to the problem of conflict within their groups. Thus, far from automatically rejecting the dissenting member, they tried by a variety of compromises to incorporate him within the group.

b. *The Deviate*

A special problem arose in controlling the role of the deviate. Two conditions were necessary to our experimental design: that the "stooge" subject should make a different choice of plane from the others in his group, and that the rest should be unanimously opposed to him. While we were able to ensure that the "stooge" chose the least attractive plane, the behaviour of the rest of the group was free to vary. Thus a constant condition (perception of the "stooge" as a deviate) was itself a function of the dependent variable (communication). This circularity in design gave rise to some difficulty in comparing the findings of different countries, as there was considerable variation between them in the extent of a majority decision and speed with which it was reached.

The point is of general methodological interest in experimental group psychology, since it raises the problem of "feed-back" from the "control subject" to the "real subjects". Our assumption had been that, as discussion progressed, the need to reach a group decision would master individual needs. But it is possible that the behaviour of the deviate, in persisting quietly and unaggressively with his own choice, may have reinforced the strength of individual goal preferences. ("If he won't give up his choice, why should I?") We have, therefore, to consider the possibility that the presence of the deviate may have functioned as a pressure towards individuality of choice rather than towards group unanimity. This supposition is consistent with recent findings in studies of contagion in small groups (3) which show how readily "stooge" subjects are able to induce others in a group to imitate them. If, in addition to the influence of example given by the "stooge" deviate, we can assume that the previous club experience of the English boys had made them more tolerant of differences of opinion in groups, we may be able to account for the high frequency of groups in England where the boys did not reach agreement in opposition to the deviate. Of the 32 groups observed, only 12 reached agreement,[2] 6 were unanimous in agreeing with the deviate and 14 were divided when the discussion closed.

CRITERIA FOR DEFINING THE INDEPENDENT VARIABLES

In applying the traditional methods of experimentation to social psychological phenomena, we are beset by many difficulties in defining the inde-

2. In the earlier report (5) of comparative results, it is only these 12 groups which have been considered.

pendent variables. Whereas in psychophysics, for instance, we are able to use standards determined by well-agreed physical measurements, in social psychology we expect that apparent similarities between stimuli will mask wide subjective variations in meaning. Therefore, it is necessary to carry out sub-experiments, the purpose of which is to define[3] the variables whose function we wish to determine in the experiment proper.

It is not easy to decide when and how such sub-experiments should be carried out, since it is inevitable, if the same subjects are used, that the results will be confounded with those of the main experiment. For instance, if we are interested in the relative value to our subjects of two kinds of reward, we may give them a choice before the experiment proper, but then the effect of the act of choice will be confounded with the subsequent experimental conditions we are trying to test. On the other hand, if we proceed, as in the present study, and attempt to assess our independent variables *after* the experimental treatments have been administered, there is no way of knowing whether the independent variables or the intervening discussion or possibly both in interaction produced the results.

Thus it is not surprising that our tests of the independent variables give different results for groups which did not reach unanimity in their discussions, compared with groups which did become unanimous. In the absence of other information, the results for the groups where subjects failed to agree are consistent with the *ex post facto* hypothesis that the impasse of their discussion, with its unfinished and sometimes desultory conclusion, produced negative attitudes towards the whole experience. For instance, goal rankings in "divided" groups were somewhat lower than those where the majority agreed, and the latter were keener than the former to meet more frequently, and were more optimistic about the possibility of their future success.

We had many occasions to observe, also, the way in which a question designed to elicit information in a restricted context may touch off dominant and more generalized attitudes. The earlier account (5) of the study has already drawn attention to the difficulties encountered in finding out how far the boys responded to the experimenter's information that their club had a high/low chance of success. The English boys were the most reluctant to admit the possibility of their failure, and consistently pursued a policy of moderation in assessing their chances at 50–50.

In a study such as this, where *a priori* definitions of the independent

3. A problem arises in the frequent confusion between an *a priori* definition of the independent variable and an empirically established one. For instance, in the well known experiment on Frustration and Regression, Lewin and his co-workers (1) aimed to induce a state of frustration in their child subjects by means of certain acts on the part of the experimenter. The dependent variables were characteristics of the children's play: variations in constructiveness. But since the experimenter's attempt to frustrate the children was not able to be assumed, another characteristic of the play—the amount of time spent in "barrier behaviour"—was used as an index of the state of frustration in the children. It is clear that constructiveness of play and amount of time spent at the frustrating barrier screen are *a priori* related, since constructive play requires longer time sequences than non-constructive play. Yet this feature of play is used as an index of the independent variable "frustration", and its relation with the dependent variable stated as an experimental outcome.

variables may be inadequate, and where attempts to use the experimental subjects to assess the subjective equivalence of the conditions confound the main effects, the safest method is to carry out independent observations with comparable subjects. For instance, control groups might receive the experimental instruction and then be given the measures without proceeding to a discussion. That such control groups are not often used in experimental studies of group behaviour is certainly in part due to the difficulties of assembling enough suitable subjects for group comparisons to be made.[4]

Not only is it hard to know whether subjects are experiencing the psychological states intended by the experimenter, but it is also often difficult to interpret the effects of interactions between variables. For instance, in the present study we needed to consider the possibility of a gradient of goal values, since goal values vary with distance from the goal and with possibilities of attainment. High probability of failure may for some subjects increase the attractiveness of the goal (by adding a scarcity value), while for others it may have depressed it, making it seem remote, perhaps producing a "sour grapes" reaction.

In experimental studies of group behaviour, the complexity of the phenomena renders it extremely difficult to make exact predictions of outcome. Too often the wish to emulate the precision of other disciplines tempts the investigator to a narrow formulation of his problem, which, by removing certain essential contexts of the events being studied, impairs the accuracy of his observation. An essential context in any experiment, and especially in a social psychological experiment, is the experimenter himself. For instance, in the present study, the boys may have maintained positive feeling toward the idea of their club's continuing, but have developed negative attitudes toward the experimenter. In such circumstances, it may well be that the deviate who blocks completion of a discussion initiated by the experimenter, would receive some positive support from his group, sufficient to offset any tendencies to reject him.[5]

CONCLUSIONS

Many people contend that the study of group behaviour has not yet reached the stage where it can safely and profitably adopt the experimental method. They would assert that far more field observation should take place before we can isolate, let alone control, the relevant variables. For there is little doubt that the investigator of group behaviour is beset by all the problems of personality research—magnified many times. Each person in

4. In the present experiment, for instance, nearly 600 subjects had to be approached to produce a final total of 32 groups.

5. A recent study by Heyns (2) shows that there is a greater acceptance of opposing behaviour in negatively led groups such that those in the group who are in opposition to a group decision receive high popularity ratings.

the group may be regarded as part of each other person's stimulus field, which is constantly changing, and further complicated by the self-perceptions and expectations of each person in relation to the others (i.e. each member, with varying insight, perceives something of how the others perceive him, and reacts to this).

This complex of reciprocal interaction between persons in a group makes it very doubtful whether much success can be expected with the attempt to control the more subtle aspects of group motivation, since new needs are constantly emerging, and these are often at variance with the stated aims of the group. The problem of assessment is difficult enough, for we still need to decide how far the experimenter has intervened when he makes his observations and tests, and how far the intended realism of the experimental situation has been destroyed by the act of observation. But when the attempt is made to *control* as well as to observe such factors, there arise the many difficulties in defining the stimulus situation which have been discussed above.

At this stage in the development of experimental group studies, it appears to be much more profitable to choose as independent variables such factors as can be readily identified, and to allow a freer range of variation to the more subtle aspects of social interaction. For instance, factors such as size of group, or variations in the length of time individuals have been members of groups (behaviour towards the newcomer), and the effect of various kinds of restricted communication are appropriate for an experimental approach.

For certain types of problem, the method of employing "stooge" subjects offers many advantages, despite the limitations imposed by the histrionic ability of the stooge, and by the *naïveté* of the subjects. Some problems which arose in the present study, and which would lend themselves well to research by this method, concern the effects upon subsequent discussion of variations in initial balance of opinion in a voting situation; the comparison of the effect on group discussions of different types of deviate, e.g. the quiet individualist *versus* the aggressive obstructor; and the effect on group discussion of having more than one deviate.

In reviewing our experience in conducting the group experiment reported here, we would stress the need for a closer link with field observation, both in formulation of hypotheses, and in the selection of categories of observation to be employed in the expetiment; the use of control groups in assessing the effectiveness of the independent variables; the extension of observation over a longer period than one group meeting; and the adoption of a role by the experimenter which would afford information about the subjects' perception of that role.

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BIOGRAPHICAL NOTES

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EDITORIAL NOTE

In the preparation of the article "Cross-Cultural Experiments on Threat and Rejection" in *Human Relations*, Volume VII, Number 4, certain manuscript material relevant to the personnel and nature of the Organization for Comparative Social Research was condensed into Footnote 1 of the article. This footnote may have created a misleading impression of the organization, and we therefore publish below a correct description in footnote form:—

The Organization for Comparative Social Research is an international research organization made up of social scientists from seven European countries. The organization is composed of two sections; one conducting attitude surveys and the other conducting group experiments. Personnel responsible for the planning and execution of the experiment reported in this paper are the following: Belgium: University of Louvain: Josef Nuttin (Research Director), Rafael Kluppels, Valère Lamsens; France: Centre d'Études Sociologiques, Paris: Paul Maucorps (Research Director), Jacques von Bockstaele; Germany: Institut für Sozialforschung, Frankfurt: Diedrich Osmer (Research Director), Volker van Hagen, Werner Mangold, Christoph Oehler, Inge Rauter, Peter Schönback; Netherlands: University of Amsterdam: Hubertus Duijker (Research Director), Mauritz Mulder; Norway: Institute for Social Research, Oslo: Ragnar Rommetveit (Research Director), Gerdt Henrik Videler; Sweden: University of Stockholm: Joachim Israel (Research Director), Irene Steg; United Kingdom: University College, London: Cecily de Monchaux (Research Director), Sylvia Shimmin, Kenneth Miller, Godfrey Gardner, Brian Allt. During 1952–53, Stanley Schachter acted as research coordinator for this group.

GIFT-GIVING AS A FUNCTION OF GROUP STANDARDS

ROBERT R. BLAKE, MILTON ROSENBAUM, AND RICHARD A. DURYEA

Knowledge of how standards function to produce characteristic levels of action is beginning to clarify the psychological meaning of a range of social behavior hitherto resistant to conceptual and experimental analysis. The applicability of these concepts for a situation involving gift-giving is explored in the present study by testing the hypothesis that when conditions permit, the size of a donation made in a fund-raising campaign will be governed by the size of gift presumed to be "standard" for the group as a whole.

A number of experiments have shown the utility of the "standards" concept for analysing and predicting a rather wide variety of social behavior. It would seem that any situation in which the members' action can be described as anchored to some standard or as maintaining a characteristic level should yield to analysis in these terms. For example, experiments dealing with factors responsible for eating habits (12), production level in factories (2), volunteering services for some cause (14), and the social consequences of violating the group cognitive standard with respect to a discussion problem (13) have all been investigated in these terms. The above, as well as Sherif's classical study of behavior change under the impact of group judgment in the autokinetic situation, point to the conclusion that group-regulated standards function to orient the individual in his response to that situation (15). The analysis by Kelley (8), and related investigations such as Hyman's study of reference group standards (7), Newcomb's Bennington study (11), the studies reported in *The American Soldier* (16), and the re-examination of the *Soldier* data in Merton and Kitt's chapter from *Continuities in Social Research* (10), show that standards presumed to exist in reference groups function to orient judgments, attitudes, and actions in much the same way as they do for primary or face-to-face groups. An analogue of the group standard concept has been shown to function in judgmental situations where an "own" standard serves as the basis for judgment. A typical experiment

here is the one by Marks (9), demonstrating that whether others are described by Negro subjects as lighter or darker in skin color is in part a function of "own" skin color taken as standard. Helson's *Adaption Level* represents a comprehensive mathematical development of the Levels concept that has been employed for the analysis of individual behavior (5). Research that has taken into account additional variables such as the cohesiveness of the group, the relevance of the behavior to group maintenance, status position of individual members, and so on (3, 4, 6), has already identified some of the more important dimensions that interact with cognitive standards to determine specific actions in a variety of social settings.

THE PROBLEM

In the study presented below, the "standards" concept is employed to study a kind of social action which has frequently been approached from the angle of individual differences along a trait dimension of stinginess-generosity. It explores the hypothesis that gift-giving, viewed as the consequence of a judgmental act, is regulated in significant measure by the social framework within which the gift is requested. The line of analysis that led to this way of thinking about gift-giving is outlined in the following section.

If the amount a group member pledges for a purpose like ". . . buying a gift for the secretary who is leaving . . ." is regarded as the outcome of an act of judgment governed by factors operating in the field at the time the request is made, then one can ask, "what factors are likely to mould individual judgments about the amount that constitutes an appropriate sum to give?" Since the request is nonspecific—designating no standard amount which is expected—it seems reasonable that personal and social factors will function to control the amount actually given. Since it is unlikely that personal factors such as inadequate funds will produce significant differences when the overall amount to be collected from a rather large group is small, the present study centers on manipulating social factors in the effort to predict the specific amount an individual will contribute in such a fund-raising campaign. The reason for expecting that social factors will prove critical in this kind of situation is suggested by the kinds of questions frequently asked in any money-raising campaign. "What should I give? What is expected of me? How much is being given by others?" By virtue of the frequency with which these kinds of questions are asked, one can assume that group members operate under the pressure of achieving conformity with a standard in such situations. To give less than others is to appear selfish, uncooperative or stingy; to give more is to appear insensitive or to embarrass others because they have given something less. It would appear that motivation operates in the direction of giving a fair "share", and the proper value of a "share" seems to be determined by what others do when faced with the same request. By this analysis, giving a proper "share" is synonymous with conforming to the standard set by the group; failure to do so means running the risk of

social deviation, with all that this may imply in terms of losing status and so on.

If this analysis—of some of the group factors that control behavior in the social situation calling for small donations—is essentially correct, it should prove possible to make predictions of the amount a person will contribute as his "share" in a specified situation. The possibility of making such predictions is based on the hypothesis that if a group member has the opportunity to know or to infer what others in this group have done in the same circumstance he will feel inclined to do the same. The validity of this general proposition can be tested simply by varying the group standard—the size of share the subject has reason to believe others have given—and determining whether or not the amount pledged is affected in significant measure by that knowledge. If contributions follow the standard despite the fact that instructions say, "give whatever you'd like . . ." this would constitute strong evidence that the dynamics of gift-giving are understandable in terms of the more general theory of the conditions under which group standards function to produce conformance behavior. That is to say, such a result would demonstrate that group standards function as the adequate stimuli in the individual's formulation of the amount he should contribute, at least in situations comparable with the one described below.

THE EXPERIMENT

The Study

A natural occasion for conducting this study arose in the following way just at the time its design was under preliminary discussion. After more than two years in her position, the secretary in the Department of Psychology at The University of Texas decided that she would resign from her post, but that she would not actually leave for another six weeks. Because of the length of the notice given, the fact of her decision to resign became rather general knowledge before her departure, and two students felt that the graduate body as a whole would like the opportunity of contributing to a fund for the purpose of presenting her a farewell gift. The enthusiasm of the response to this suggestion is indicated by the fact that participation was unanimous. The invitation to donate, then, involved a genuine situation rather than a hypothetical instance of gift-giving.

Subjects

In selecting the graduate students to be invited to participate only one restriction was introduced. Based on this restriction, employed to ensure that each participant would actually feel himself a member of the group, it was decided to solicit only those students whom one or both of the two experimenters knew personally. The assumption underlying this decision was that if the subject had been in residence long enough to be known by the

two experimenters—both of whom had been in graduate residence for about two years—he would undoubtedly have made the acquaintance of the secretary as well.

A list of fifty students was drawn up in this fashion. Assignment to one or the other of the two experimenters was done on a random basis, except that if a student was known to one but not to the other an exchange was worked out so that the experimenter knew the twenty-five people he was to solicit. Random placement within a sub-group was further modified by distributing men and women equally between the two experimenters. The final list, then, contained 50 names divided into two groups of 25 each, with each group containing 22 men and 3 women.

Procedure

The two male graduate students who served as experimenters approached each subject in the following manner: "Have you donated yet?" This question usually provoked the response, ". . . donated to what?" The experimenter then said, "You know, M—— (the secretary), is leaving and we're making a collection to buy her a gift. You can give whatever you'd like. How much do you want to give?" The experimenter stood beside the subject, permitting him to see a slipboard holding several sheets of 6″ by 10″ loose-leaf filler. As he asked the final question, he lifted the top sheet slightly, as if preparing to write the subject's name on the second sheet. During this time he kept the top sheet clearly in the subject's view. The top sheet on the clipboard contained information that served to define one of the five conditions employed in the present study. These conditions, described in *Table I*, will be discussed later.

To any additional questions the experimenter responded whenever possible by repeating the appropriate part of the original instructions. For example, if asked directly whether the values listed on the top sheet were the usual run of donations he would repeat, "You can give whatever you'd like." The only exceptions were those in which the subject asked for further information about the secretary's departure, and these were answered as far as possible by filling in factual detail. The experimenters adhered strictly to the rule forbidding them to make any reference to the clip board.

Conditions

Several factors were considered in setting up the five conditions employed in conducting the study. The first involved introducing a condition that would permit determination of the amount that would be given in the absence of any standard—the "no standard" condition referred to as condition 1 in *Table I*. A second consideration related to the size of the standard, the amounts written on a face sheet; conditions 2 and 3 are based on an average contribution of twenty-five cents, while conditions 4 and 5 are based on an average of seventy-five cents. A third consideration involved

the variation in the sizes of the contributions shown on the face sheets; in conditions 2 and 4 the individual differences in the amounts shown were small, while in conditions 3 and 5 they were somewhat larger. By keeping these three conditions in mind it is possible to test the hypothesis stated above in two different ways: one can determine whether the introduction of a fixed standard had any effect on the amount given, by contrasting the results obtained from conditions 2 through 5 with those from condition 1. It is also possible to determine whether a narrow range of differences in the standard produces a narrower range of individual donations than does a wider range of values in the standard, by contrasting the variance in contributions offered under condition 2 with that of 3, and 4 with 5. The composition of the various conditions is described in greater detail in *Table I.*

TABLE I *A SUMMARY OF THE FIVE EXPERIMENTAL CONDITIONS*

Condition	*Description*
1	This face sheet had "amount paid" written at the top. It carried no other information. In the text this is referred to as the "no standard" condition.
2	Below the words "amount paid" a list of ten two-digit numbers with decimal points and a dollar sign preceding them were written in pen and ink as if they had been recorded as they had been given. These values, intended to convey the idea that these were the amounts others contacted earlier had given, were $.25, $.25, $.15, $.25, $.30, $.35, $.25, $.20, and $.25. This series is based on an average of twenty-five with small variations in the values of the individual contributions around this value.
3	This face sheet differed from the one described above only in the amounts shown. They varied more widely around the twenty-five cent average. The actual values were $.25, $.25, $.15, $.25, $.40, $.35, $.25, $.10, and $.25.
4	This face sheet presented numbers based on an average of seventy-five cents, with variations in the individual values that were structurally comparable with those shown in condition 2. The values were $.75, $.75, $.60, $.75, $.75, $.90, $.85, $.75, $.65, and $.75.
5	The values presented on this face sheet differed from those described above only by their wider variation around the seventy-five cent average. The values were $.75, $.75, $.60, $.75, $.75, $.90, $1.00, $.75, $.50, $.75, and $.75.

Administration

The conditions were employed through systematically changing the top sheet that was kept in the subjects' view. In all, five different top sheets were used, with the words "amount paid" written in pen and ink at the head of each. The remaining material included on each face sheet is described in *Table I.*

After each subject had decided on the amount he wished to give he was immediately informed of the nature of the experiment and requested not to communicate this information to others. No money was actually exchanged at the time of data collection, but after the experiment had been completed a bona fide collection was taken and the gift made in routine fashion.

The five conditions were presented in serial order to the first five and in reversed serial order to the next five, and so on, until all fifty subjects had been solicited.

RESULTS

The data presented in *Table II* show that the introduction of a group standard produced the predicted effect in rather remarkable fashion. The average amount donated under the twenty-five cent standards (conditions 2 and 3) was actually thirty-two cents; for the seventy-five cent standards (conditions 4 and 5) the average was sixty-three cents and for the condition involving "no standard" the average was seventy-five cents.

TABLE II *AMOUNTS CONTRIBUTED BY THE FIFTY SUBJECTS UNDER THE FIVE CONDITIONS*

	Subject	*"No Standard"*	*25c Standard Small Variation*	*25c Standard Large Variation*	*75c Standard Small Variation*	*75c Standard Large Variation*
Experimenter 1	1	·50	·25	·50	·65	·50
	2	·50	·25	·25	·75	·30
	3	·50	·35	·25	·50	·75
	4	1·00	·25	·25	·50	·50
	5	1·00	·25	·25	·75	·50
Average		·70	·27	·30	·63	·51
Experimenter 2	1	·50	·50	·25	·70	·75
	2	1·00	·25	·25	1·00	1·00
	3	·50	·25	·50	·50	·75
	4	1·00	·25	·50	·25	·50
	5	1·00	·25	·50	·75	·75
Average		·80	·30	·40	·64	·75
Average for 10 subjects		·75	·28½	·35	·63½	·63
Combined Average for same standards			·31¾		·63½	

Significance tests, presented in *Table III*, demonstrate that the differences between the average amounts given under the two sets of standards are

highly significant, and that the average difference between the amounts given under the small standards and the "no standard" conditions is also highly significant. The amounts pledged under the higher standards and the "no standard" conditions are not significantly different from one another.[1]

TABLE III *TESTS OF SIGNIFICANCE BETWEEN THE EXPERIMENTAL CONDITIONS*

Conditions	t*	P	Predicted
1 vs 2	5·33	<·01	yes
1 vs 3	4·31	<·01	yes
1 vs 4	1·09†	>·05	no
1 vs 5	1·14†	>·05	no
2 vs 3	1·35	>·05	yes
2 vs 4	5·01	<·01	yes
2 vs 5	4·99	<·01	yes
3 vs 5	3·72	<·01	yes
3 vs 5	3·68	<·01	yes
4 vs 5	0·54	>·05	yes

* Fisher's t for differences between uncorrelated means.

† Because of heterogeneity of variance in two cases, a different number of degrees of freedom was used. (See Edwards, Allen L. *Experimental Design in Psychological Research.* New York: Rinehart, 1950, p. 170.)

Having determined that the amounts given under the various standards are significantly different from one another in those cases where theory predicts that they should be, the next analysis is concerned with contrasting the differences that obtain between the values shown on the face sheets themselves and the values for the contributions actually obtained. Here the prediction is that the four sets of distributions should not be significantly different from the respective standards under which they were collected. This prediction follows directly from the hypothesis that when other conditions permit, the average size of a donation will be governed by the average size of the donations shown in the standard that functions to orient judgment in that situation.

The data necessary for testing this prediction are shown in *Table IV*. In no case does a comparison produce a significant difference. That is to say,

1. In setting up the various conditions an effort was made to select "fixed" standards about equally far away from the average contribution expected under the "no standard" condition. Based on a preliminary survey, it was concluded that the average under the "no standard" would hover around fifty cents. However it turned out that the amount participants were ready to give under the "free condition" was actually more than had been expected, with the unfortunate consequence that the average amount given under the "no standard" coincided with the seventy-five cent fixed standards. From a practical point of view, then, this study shows convincingly only that selection of a standard which is smaller than the "free" amount can have the effect of decreasing the average size gift below what it would otherwise have been. Actually another experiment would be required to test the proposition that it is possible to create conditions that will produce larger amounts than participants seem ready to give under the "no standard" condition.

the values shown on the face sheet, for condition 2 for example, are not statistically different from the amounts actually collected under condition 2, and the same statement holds for the comparisons for conditions 3, 4, and 5. Looked at in connection with the significant differences between the amounts donated under the several standards reported in *Table III*, these results provide additional evidence in favor of the conclusion that the size of gift offered in this situation is affected by the size of gift presumed to be characteristic for the group as a whole.

The actual raw values for each of the five conditions presented in *Table II* merit detailed examination since they provide the basis for analysing the behavior of individual subjects. For condition 1, involving "no standard", the ten subjects split evenly in the amounts they pledged; half offered fifty cents, the other half an even dollar. For conditions 2 and 3, both based on a twenty-five cent standard, an overwhelmingly large proportion of the gifts —fourteen of the twenty, or seventy per cent of the total—were identical with that standard. The results for the two standards involving seventy-five cents, conditions 4 and 5, are not quite as clear-cut, though the trend mentioned above is still clearly observable; here seven of the twenty, or thirty-five per cent of the total, are identical with the standard. Furthermore, not a single contribution given under the "no standard" condition is identical with either of the two experimentally created standards. The standards, then, apparently had the effect of establishing the amount considered appropriate in this situation, even though the instructions provided freedom to give donations of any size.

TABLE IV *TESTS OF SIGNIFICANCE BETWEEN THE OBTAINED DATA AND THE STIMULUS STANDARDS*

Values shown	t*	P	Predicted
Condition 2 vs contributions	1·14	>·05	yes
Condition 3 vs contributions	2·04	>·05	yes
Condition 4 vs contributions	1·64	>·05	yes
Condition 5 vs contributions	1·55	>·05	yes

* Fisher's t for the difference between uncorrelated means.

The differences in the individual amounts contributed under the "no standard" of condition 1, and the values contributed under the seventy-five cent standards of conditions 4 and 5, also merit brief mention. While the differences between the average amounts offered under each of these two sets of conditions are not significant, the specific amounts offered under each are conspicuously different, as a comparison between column 1 and columns 4 and 5 of *Table II* will show. Whereas one half the donations under the "no standard" condition involved a flat dollar, only two of the twenty subjects operating under either of the seventy-five cent standards volun-

teered to give this amount. By comparison with the fifty cent contributions given by one half the subjects under the "no standard" condition, this same amount was given by seven of the twenty subjects from the two seventy-five cent groups.

With respect to the third consideration entering the design, the results do not support the view that a narrow range of variation in a standard produces a higher degree of conformity in the sizes of the individual contributions than does a wider range of variation. To bear out this assumption it would have been necessary for the contributions given under condition 3 to show a greater amount of variation than those given under condition 2, and the same relationship would have had to obtain between conditions 5 and 4. Actually there is slightly more consistency in the size of contributions given under condition 2 than under 3, but the trend is reversed in the comparison of 4 and 5. The respective F's of 2·49 and 1·02 do not begin to approach limits of significance that would allow acceptance of this view. Rather than being "freed" from the effects of the standard when the variability in it is larger, the conclusion seems to be that subjects simply gave what appeared to them to be "average" contributions.

Table II is arranged to show the results obtained by each experimenter; the values presented in the top half were gathered by one of them, and those in the bottom by the other. The amounts are slightly different as a function of the experimenter variable, but the differences, yielding a t of 1·23, are far from significant. The conclusion here is that the experimental differences correlated with the standard far outweigh the slight and insignificant differences attributable to the experimenter.

DISCUSSION

The evidence from this experiment permits acceptance of the hypothesis the study was designed to test: when other conditions permit, the size of donation made in a fund-raising campaign of the kind outlined is governed by the size of gift presumed to be standard within the group as a whole. This is interpreted to mean that a psychological approach to gift-giving must take two related but distinct processes into consideration. On the one hand these results force an examination of the motivational side of this behavior; on the other, they center attention on the cognitive problem involved in judging or assessing an attribute like the "average" of a set of numbers. These are dealt with in turn below.

Looked at as a problem in motivation, four lines of evidence suggest that subjects view the subjectively most acceptable solution in this sort of social field—in which ambiguous instructions say, "Give whatever you'd like . . ." but in which the action taken by others appears quite obvious—as one that involves selecting a response that "fits" the middle range of behavior presumed characteristic for others participating in the project. This is in contrast

with selecting a response coinciding with the lower or upper limit, or giving some other value which is completely out of range. The first evidence is based on the finding that the size of donation closely approximated the size of the standard under each of the four conditions in which a standard was presented. The second line of evidence comes from the fact that average size of donation remained approximately the same regardless of the variability of the values presented in the standard. The third kind of evidence is found in questions that subjects asked during the collection of data. It was by no means uncommon, even under the conditions where visible standards were presented (and, as later questioning showed, *seen* as well), for subjects to seek verbal reassurance that they were giving the "right" amount. On those few occasions where a smaller amount was given the "explanations" for them clearly indicated the subjects' embarrassment at not being able to match the rest of the group. Finally, the condition involving "no standard" produced contributions based on two modes differing widely from one another and, therefore, not revealing the stereotyped consistency of adherence to a single standard apparent in the other conditions. These four sources of evidence, then, point to the conclusion that a contribution in the middle of a range of contributions presumed to have been characteristic for others represents a preferred solution in this kind of situation. By giving a response located in this region a subject's behavior is neither unique nor conspicuous nor deviant; by contrast with the performances of others he is merely typical. As such, it would appear that the motivation behind gift-giving is understandable in terms of conformance to standards presumed to be operating in the group.

If the amount to be collected were much larger than the sums involved in this experiment, or if other factors, like lack of personal acquaintance between experimenter and subject, were to be changed, undoubtedly different results would be obtained. Future steps in this area of research might concentrate on varying such factors in a systematic way. There is good reason to believe, however, that the variable representing the group standard will continue to prove central even when other field conditions are complicated considerably.

Looked at from the judgmental angle the cognitive aspect of this problem seems to involve making a quick assessment of the "average" of a series of known values. How such an approximation is made, in the absence of the opportunity to employ mechanical means for adding and dividing by the number of values included, constitutes a complicated cognitive act with which the present study is not concerned. This problem has been examined in an exploratory fashion in another experiment (1) in which the results demonstrate that for college subjects the assessment of "average" for a distribution of numbers presented aurally is excellent under conditions much more complicated than those involved here. In that study, four sets of eighteen two-digit numbers spoken at two-second intervals through a tape recorder were used, with stimulus numbers selected to form distributions of

different shapes (rectangular, normal, Poisson) and ranges, and also to represent different absolute values (i.e., variations in absolute size; whether the numbers were in the 10's, 40's, or 70's etc.). From this it was found that the estimated averages were not significantly different from the arithmetical means for the number sets themselves. While it was not the object of that study to discover the limits beyond which this kind of assessment cannot accurately be made, the fact of its greater relative complexity by comparison with the task presented in this study demonstrates that judging the "average" of the ten numbers shown on the face sheets is well within the limits of achievement for the kinds of subjects used.

SUMMARY AND CONCLUSIONS

Testing the hypothesis that when other conditions permit, the size of a donation is governed by the amount of contribution presumed to be "standard" for the group as a whole, the present experiment was designed to determine the applicability of the concept of group standards for a situation involving gift-giving. The study was carried out under real life conditions in connection with the purchase of a gift for a secretary who was resigning her post.

Fifty graduate students served as the subjects and two additional graduate students as the experimenters. Each student responded to the question, "give whatever you'd like . . ." under conditions that permitted him to see a clip board carried by the experimenter which showed the amounts others, presumably contacted before him, had contributed (except for one condition, where the clip board had nothing written on it but the words, "amount paid"). In the four conditions involving standards, different distributions of numbers were presented. Two of them were based on an average donation of twenty-five cents; two of seventy-five cents. Within each of the two sets of distributions different ranges of contributions were included to permit investigation of the effect of internal agreement among "others" on the range of contributions offered.

The hypothesis that the size of contribution is governed by the size of contribution presumed to have been given by others, was confirmed. Under the twenty-five cent standards, the average contribution was thirty-two cents; under the seventy-five cent standards the average was sixty-three cents. The amount of variability contained in the standard did not seem to affect the size of donations received. Questions subjects asked, suggesting that they were seeking verbal reassurance that they were giving the "right" amount, were also interpreted as lending support to the hypothesis.

This behavior is interpreted from two distinct but related points of view. First, it represents a problem in social motivation. Secondly it involves a cognitive act. The motivational question concerns the question of why subjects prefer a solution which makes them appear "typical"; the cognitive

problem deals with the question of how subjects go about assessing the "average" of any number series. The first was dealt with in terms of the more general theory of conformance behavior, while the second was approached as representing a problem in the general field of judgment.

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BIOGRAPHICAL NOTE

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SOCIEMPATHY AS A FUNCTION OF SOCIOMETRIC STATUS IN AN ADOLESCENT GROUP [1]

DAVID P. AUSUBEL

The term, *sociempathy*, refers to a particular kind of social perception, i.e., to an individual's awareness of his own and others' sociometric status in a given group of which he is a member (2). In sociempathic research, such awareness of sociometric status (as reflected in the ability to make accurate predictions of it) is the psychological variable under investigation; sociometric status itself—as one of the many objectively measurable dimensions of interpersonal relationships in group structure—merely constitutes the object of perception.

In previous studies we have been interested in ascertaining whether sociempathic ability improves as a function of increasing age (2), and how it is influenced by such characteristics as sex and affective response of the perceiver to the subject perceived (1). In the present study we were concerned with various relationships between (a) sociempathy and (b) sociometric status considered as a variable in its own right, i.e., apart from its role as the object of perception. Relationships such as these have important implications for intra-group structure. They indicate to what extent an individual's sociometric status in the group affects both the accuracy with which he perceives his own and others' status, and the accuracy with which his own status and his sociometric acceptance of others can be perceived by fellow group members. And conversely, they indicate to what extent sociempathic ability and relative transparency of sociometric attitudes may affect sociometric status in the group.

METHOD

Population

The population consisted of 141 high school students from University

1. This research was supported by grants from the Bureau of Educational Research and from the University Research Board, University of Illinois. I am indebted to Dr. Norman E. Gronlund of the University of Illinois for suggesting certain aspects of this problem.

High School [2] in Urbana, Illinois. Data were collected separately from each of two junior classes and from one senior class. The mean age of these students was 16·2 years, and the distribution by sex was 55 boys and 86 girls. The socio-economic status of the group as a whole was well above average, the parents for the most part being professional people, a large percentage of whom held academic appointments at the University of Illinois.

Procedure

The raw sociometric data for this study were obtained by requiring each student to rate all of his classmates on a five-point scale in terms of acceptability as friends, and to predict how each of his classmates would rate him and be rated by the group on the same basis. The details of this procedure have been described in a previous publication (2).

RESULTS AND INTERPRETATION

Ability to perceive own sociometric status was expressed as a total discrepancy score of each individual representing the sum of the deviations of his predictions of how others would rate him from the actual ratings given him by these persons. Ability to perceive the sociometric status of others was expressed as a total discrepancy score for each individual representing the sum of the deviations of his predictions of the sociometric status of others from their actual sociometric status. An individual's sociometric status was determined by finding the mean of all the sociometric ratings he received from his classmates.

The two sets of discrepancy scores did not differ significantly from the normal in distribution, and were reflective of an ability other than chance far beyond the one per cent level of significance. The respective split-half (odd-even) reliability coefficients were ·80 and ·76.

In order to answer the questions posed by this study, three groups of subjects were constituted—upper, middle, and lower thirds of the distribution in terms of sociometric status. For each subject, mean discrepancy scores were obtained representing his relative degree of error in predicting the sociometric status and attitudes toward himself of members of his own status group as well as of the other two status groups. Then, by averaging these six kinds of predictions for all members of each of the three status groups, the following mean discrepancy scores were obtained in relation to each type of sociempathic ability (i.e., perceiving the status of others, and perceiving own status): (a) accuracy of the high status group in predicting the sociometric status and attitudes of persons of high (Hh), middle (Hm), and low (Hl) status; (b) accuracy of the middle status group in predicting the sociometric

2. The administrative assistance and cooperation of Professor Charles M. Allen, principal, and of the staff of University High School in the collection of these data are gratefully acknowledged.

status and attitudes of persons of high (Mh), middle (Mm), and low (Ml) status; and (c) accuracy of low status group in predicting the sociometric status and attitudes of persons of high (Lh), middle (Lm) and low (Ll) status. In this scheme of notation, the group making the prediction is indicated by a capital letter which is placed first and followed by a small letter indicating the group the sociometric attitudes or status of whose members is being predicted.

The Relationship between the Sociempathic Ability of the Perceiver and his Sociometric Status.

In order to ascertain whether the perceiver's sociempathic ability was related to his sociometric status, the mean discrepancy scores achieved by each status group were compared to the corresponding scores of the other two status groups in predicting the sociometric ratings and standing of members of the high, middle, and low groups respectively. When the significance of the differences between all possible pairings made in this fashion was calculated, the evidence was quite conclusive that for our adolescent population as a whole the sociometric status of the perceiver was not related to his sociempathic ability. Only one difference was significant at the five per cent level of confidence, i.e., members of the high status group were significantly more accurate in predicting the ratings given them by their fellow group members than were members of the low status group in predicting the ratings they received from the upper group. When all of the predictions made by a given group were pooled, no significant differences were found between status groups in mean discrepancy scores.

To test an hypothesis suggested by previously reported findings for a comparable but smaller group of adolescents (1), correlations were run separately for each sex group between sociometric status and each type of sociempathic ability. Confirming these prior findings, correlations of approximately zero were obtained for both sexes between sociometric status and accuracy of perceiving *others'* status, but a correlation of 132 ($p<\cdot01$) was found between the former variable and girls' ability to perceive *own* sociometric status. The corresponding correlation in the case of boys was ·06.

It could be argued, of course, that high sociometric status puts an individual into a more strategic position (by virtue of more frequent and intimate interpersonal contacts) to perceive more accurately the sociometric feelings of others (7). An alternative explanation suggested by findings in several studies (4, 6) is that individuals who are superior in a given trait tend to be superior in estimating the occurence of that trait in themselves because they have less reason to be defensive about it. On the other hand, neither explanation accounts satisfactorily for the sex difference which can be more credibly explained as an outcome of a tendency on the part of girls, compatible with their culturally sanctioned social sex role, to utilize their insight into the feelings and attitudes of others as a means of enhancing their status in a group.

This latter explanation is in accord with the position taken by Gage and others (3, 7) who regard interpersonal effectiveness as a function of accuracy of social perception rather than *vice versa*.

In summary then, regardless of the direction of influence that is inferred, it is apparent that, for our adolescent population as a whole, sociometric status of the perceiver and both types of sociempathic ability are not significantly related. However, in the case of girls a slight but significant degree of relationship prevails between the former variable and accuracy of perceiving own status.

Sociempathy as a Function of the Sociometric Status of the Subject Perceived

Differences between mean discrepancy scores are presented in *Table 1* to show how accuracy of sociometric perception varies with the status of the

TABLE 1 *DIFFERENCES BETWEEN MEAN DISCREPANCY SCORES SHOWING SOCIEMPATHY AS A FUNCTION OF THE SOCIOMETRIC STATUS OF THE GROUP BEING PERCEIVED*

Differences between Specified Mean Discrepancy Scores	*Perception of Own Status*		*Perception of Others' Status*	
	D/σ_D	Significance Level	D/σ_D	Significance Level
Hh–Hm	−2·58	·01	−3·17	·002
Hh–Hl	−4·83	<·0001	−5·09	<·0001
Mh–Mm	−·36	·72	−1·80	·08
Mh–Ml	−2·50	·01	−4·83	<·0001
Lh–Lm	−·77	·44	−1·88	·06
Lh–Ll	−1·58	·11	−4·36	<·0001
Hm–Hh	2·58	·01	3·17	·002
Hm–Hl	−2·54	·01	−2·67	·008
Mm–Mh	·36	·72	1·80	·08
Mm–Ml	−2·18	·03	−3·11	·002
Lm–Lh	·77	·44	1·88	·06
Lm–Ll	−·91	·36	−2·59	·01
Hl–Hm	2·54	·01	2·67	·008
Hl–Hh	4·83	<·0001	5·09	<·0001
Ml–Mm	2·18	·03	3·11	·002
Ml–Mh	2·50	·01	4·83	<·0001
Ll–Lm	·91	·36	2·59	·01
Ll–Lh	1·58	·11	4·36	<·0001
Ah*–Am*	−1·21	·23	−2·26	·02
Ah–Al*	−2·98	·003	−4·73	<·0001
Am–Al	−1·89	·06	−2·81	·005

* Ah= mean of Hh, Mh, and Lh. Am= mean of Hm, Mm, and Lm. Al= mean of Hl, Ml, and Ll. Hence, each mean represents the average discrepancy made by a given status group in predicting for all three groups.

individual whose sociometric attitudes or status are being perceived. The three status groups are compared in terms of the mean error of prediction made when the sociometric ratings and standing of their members are forecast in turn by each of the other status groups. These comparisons demonstrate very conclusively that both types of sociempathic ability vary directly with the sociometric status of the subject perceived.

The sociometric status of high group members was perceived more accurately than that of low group members by all three status groups ($p < .0001$ in all three cases), and there was a pronounced tendency for this same superiority in accuracy of being perceived to be maintained in relation to middle group members ($p = .002$, .08 and .06). The sociometric status of middle group members in turn was forecast more accurately than that of low group members by all three status groups ($p = .008$, .002, and .01). When all predictions made for a given group were pooled, these differences between the high and low groups, between the high and middle groups, and between the middle and low groups were significant at the .0001, .02, and .005 levels of confidence respectively.

The same trend prevailed, only less markedly, with respect to the relationship between the sociometric status of the subject perceived and the accuracy with which his sociometric attitudes (ratings) were perceived. The sociometric ratings of high group members were perceived more accurately than those of low group members by all three status groups ($p = .0001$, .01 and .11), and the sociometric ratings of middle group members were perceived more accurately than those of low group members in corresponding fashion ($p = .01$, .03 and .36). Middle group members' sociometric attitudes were perceived significantly more accurately than those of low group members only by the high status group. These same tendencies were reflected in the relative significance of the differences between mean discrepancy scores when all predictions of ratings received from a given group were pooled (see Ah-Al, etc., in *Table 1*).

Why should the accuracy with which the sociometric attitudes of pupils are perceived be related to the extent to which the latter individuals are accepted by their classmates? One can hypothesize that the higher an individual's status in the group, the more secure he can feel in his interpersonal relations with fellow group members. Hence, he can "afford" to show his feelings toward others more openly and unambiguously. Also, secure in this high status, he finds it less necessary to vary experimentally the acceptance he tenders others in order to improve his own standing. Another possible explanation lies in the fact that the sociometric status of high status persons is probably more stable and undergoes fewer and less drastic fluctuations than the corresponding status positions of members of other status groups. As a result their sociometric attitudes are apt to be correspondingly more consistent.

The lower status person, on the other hand, who is ostensibly seeking to

improve his standing in the group can less "afford" to express hostility openly, and is more inclined to be devious in his acceptance of others on the basis of the widely accepted belief that an individual's status depreciates if his friendship can be won too easily. At the same time, in his quest for higher status he is apt to try different approaches (varying in degree of friendliness) to the same person, and hence to be less consistent in his sociometric attitudes. In addition, greater fluctuation in his actual sociometric status results in greater variability in his feelings of security with respect to interpersonal relations, which in turn leads to more inconsistent attitudes of acceptance and rejection.

Thus far in examining this relationship between an individual's sociometric status and his classmates' ability to predict the degree of acceptance he tenders them, we have proceeded on the assumption that the sociometric status of the subject perceived influences the perceiver's ability to predict accurately rather than *vice versa*. The alternative explanation (which reverses the direction of influence) is that by virtue of having sociometric attitudes which are more perceptible to other persons, and which, therefore, make them feel more secure, an individual tends to make himself more acceptable. This interpretation would rest on the hypothesis that most persons find ambiguity in interpersonal relations threatening, and react to such threat by rejecting group members whose sociometric attitudes are relatively inscrutable, and conversely by accepting those of their fellows whose attitudes seem relatively unequivocal (providing, of course, that the latter are not perceived as unfriendly).

Turning now to the positive relationship between accuracy of perceiving *others'* status and their actual sociometric status, plausible interpretive hypotheses are decidedly less available. By analogy from other kinds of judgmental situations, one might infer that the extremes of a given continuum of stimuli (in this case an individual's mean degree of popularity in a group) can be judged more accurately than stimuli in the middle range of the continuum. Extreme stimuli presumably stand out more clearly, and hence can be discriminated more accurately. Teachers, for example, invariably report that they experience little difficulty in identifying the most and least popular pupils in the class, but feel much less confident about identifying pupils in the middle range of popularity. Apparently, however, this confidence seems misplaced except at the upper extreme of sociometric status, since the status of pupils in the middle third of popularity is judged significantly more accurately than that of pupils in the lower third of popularity.

It appears, therefore, that some complicating factor is entering into the judgmental process of estimating the popularity of lower status persons which substantially decreases the accuracy of prediction. A clue as to the nature of this factor comes from an examination of the direction of the error of prediction. Merely through the operation of statistical regression (since actual and predicted sociometric status are significantly related), one would

anticipate that an inverse relationship would hold between sociometric status and the direction of the error of prediction. This tendency for the status of low status persons to be overestimated (and *vice versa*) should, furthermore, be augmented by the relative lack of available ceiling for both underestimating the status of unpopular pupils and overestimating the status of popular pupils.

Actually, the data show the opposite tendency to be true (see *Table 2*). The popularity of high status persons tended to be more highly overestimated than that of middle and low status persons ($p < \cdot0001$), and the status of the latter group tended to be underestimated more than that of the middle

TABLE 2 *MEAN DISCREPANCY SCORES SHOWING DIRECTION OF ERROR IN PREDICTING OTHERS' SOCIOMETRIC STATUS*

Sociometric Status of Group Making the Predictions	*Mean Discrepancy Score in Predicting for High Status Group* (h)	*Mean Discrepancy Score in Predicting for Middle Status Group* (m)	*Mean Discrepancy Score in Predicting for Low Status Group* (l)	*Critical Ratios of Differences between Mean Discrepancy Scores of Specified Groups*		
				(h) *and* (l)	(h) *and* (m)	(m) *and* (l)
High Group (H)	+·22 (Hh)	−·31 (Hm)	−·74 (Hl)	11·01	8·49	4·72
Middle Group (M)	+·13 (Mh)	−·39 (Mm)	−·65 (Ml)	9·51	6·45	2·66
Low Group (L)	+·03 (Lh)	−·18 (Lm)	−·41 (Ll)	4·16	2·29	1·99
Mean of High, Middle and Low Groups (A)	+·13 (Ah)	−·29 (Am)	−·60 (Al)	7·41	5·38	3·07

status group ($p = \cdot002$). Hence, in predicting an individual's acceptance by the group, our adolescent subjects generally overestimated the actual status of their popular classmates and underestimated the actual status of their unpopular classmates. They were, therefore, in effect predicting that the group would be less charitably disposed toward lower status persons than they themselves were, since the sociometric status of all pupils was naturally determined by the ratings of the same persons making the predictions.

These findings are even more statistically significant than shown in *Table 2* since, as explained above, they must counteract the influence of statistical regression operating in the opposite direction. They indicate that our adolescent subjects have an exaggerated perception of the conformity

demands of the group. Relatively unpopular individuals win more acceptance from the group than adolescents apparently believe, and, conversely, popular individuals are less completely accepted than they are perceived to be. In the first case, we witness the operation of a "horn effect", in the second case the operation of a "halo effect" (5).

The alternative explanation of this positive relationship between accuracy of predicting others' status and their actual degree of popularity in the group, i.e., that having a status which can be accurately predicted leads to enhancement of sociometric status, seems decidedly less plausible. It is conceivable, however, that *after* one achieves high status, the relatively high degree of accuracy with which it can be perceived acts reciprocally to augment it.

Sociempathy as a Function of Similarity in Sociometric Status between Perceiver and the Subject Perceived

In order to ascertain whether an individual could predict more accurately the ratings and status of members of his *own* status group in contradistinction to the ratings and status of members of *other* status groups, two types of comparisons were made: (a) the mean discrepancy scores of each group in predicting for its own members were compared to the corresponding scores it made in predicting for the other two groups, e.g., the mean error score of the low group in predicting for low status individuals was compared to the mean error scores of this same group in predicting for members of the middle and high groups; and (b) the mean discrepancy scores of each group in predicting for its own members were compared to the error scores made by the other two groups in predicting for the latter group of individuals, e.g., the mean error score of the low group in predicting for its own members was compared to the error scores of the middle and high groups in predicting for low status persons.

The data gave no support whatsoever to the hypothesis that adolescents could more accurately perceive the sociometric ratings or status of fellow group members enjoying approximately the same degree of popularity in the group. This hypothesis was originally advanced on the grounds that an individual would tend both to have more interpersonal contacts with members of his own sociometric stratum and would be better able to empathize with such persons in matters relating to this characteristic they hold in common. Where significant differences between discrepancy scores were obtained, they were invariably a function of the previously demonstrated positive relationship between an individual's sociometric status and the accuracy with which his sociometric ratings and status were perceived by others. Thus, although it was true that high status pupils perceived individuals in their own sociometric stratum more accurately than the latter were perceived by low status pupils, it was equally true that the low status group perceived high status individuals significantly more accurately than it perceived members of its own (low) status group.

SUMMARY AND CONCLUSIONS

Relationships between sociometric status and sociempathy (ability accurately to predict own and others' sociometric status) were examined in three classes of juniors and seniors in a university high school.

Ability to perceive own sociometric status was expressed as a total discrepancy score for each pupil representing the sum of the deviations of his predictions of how others would rate him on a five-point acceptance-rejection scale from the actual ratings given him by these persons. Ability to perceive the sociometric status of others was expressed as a total discrepancy score for each pupil representing the sum of the deviations of his predictions of the sociometric status of others from their actual status. The distributions of the discrepancy scores did not deviate significantly from the normal, and their respective split-half (odd-even) reliability coefficients were ·80 and ·76. Differential analysis of the mean discrepancy scores made by upper, middle, and lower thirds of the distribution of sociometric status in predicting the status and ratings of members of their own and other status groups respectively leads to the following conclusions:

1. For our population as a whole, sociometric status of the perceiver was not significantly related to accuracy of perceiving own or others' sociometric status. In the case of girls, however, a slight but significant degree of positive relationship prevailed between accuracy of perceiving own status and the sociometric status of the perceiver. This relationship was attributed to the culturally sanctioned tendency on the part of girls to utilize their sociempathic ability to enhance their own status in the group.

2. Ability to perceive the sociometric ratings received from others varied directly with the sociometric status of the latter (i.e., the subjects perceived). Four explanatory hypotheses were advanced to account for this finding: (a) the greater frankness with which the high status persons can afford to express their sociometric feelings, (b) the greater degree of consistency with which such persons can maintain their sociometric attitudes, (c) the greater actual stability of positions of high sociometric status, and (d) the tendency for persons whose sociometric attitudes can be unambiguously perceived by others to win greater acceptance from the group.

3. Accuracy of perceiving the sociometric status of others also varied directly with the sociometric status of the latter (i.e., the subjects perceived). This finding is in opposition to subjective reports of perceivers who invariably claim that they feel most confident in predicting the popularity of extreme members of a group. The relatively high degree of error in predicting the status of unpopular pupils was attributed to a tendency on the part of adolescents to exaggerate the conformity demands of the group, and hence to underestimate the degree of acceptance tendered to out-group members. This interpretation was supported by the finding of an inverse

relationship between the sociometric status of the subject perceived and the direction of the error made in predicting his status.

4. The data did not sustain the hypothesis that adolescents could more accurately perceive the sociometric ratings or status of fellow group members enjoying an equivalent degree of popularity in the group.

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BIOGRAPHICAL NOTE

DR. AUSUBEL received his M.D. from Brandeis University in 1943, and his Ph.D in psychology at Columbia University, 1950. Previously he has been a psychiatrist and lecturer in psychology at Yeshiva University. He is now Associate Professor of Education at the Bureau of Educational Research, at the University of Illinois.

BOOK REVIEWS

Research Methods in the Behavioral Sciences. Leon Festinger and Daniel Katz (eds.). New York, The Dryden Press, 1953. pp. 600. $5.90.

It is a simple enough matter to summarize the findings of a particular research project; it is much more difficult to describe the process by means of which these findings are obtained. Many decisions about data collection and analysis must be made and the success of the research will depend in no small extent on the skill with which these decisions are reached. The explicit focus of this volume is on research methods and particularly on the kinds of methodological decisions that must be made in the planning of any experimentation. It is the collective effort of a number of individuals all of whom are or have been associated with the University of Michigan, and it relates in many important respects to relevant work that has been undertaken at that institution over a period of the last few years.

Following an introduction on the "interdependence of social-psychological theory and methods", the contents are organized into five parts, successively entitled (1) Research Settings, (2) Procedures for Sampling, (3) Methods of Data Collection, (4) The Analysis of Data, and (5) The Application of Research Findings. Since considerable research at Michigan is carried out by the Survey Research Center and the Research Center for Group Dynamics, it is not surprising that the contents tend to emphasize survey techniques and methods for studying group performance. In the discussion of research settings, for example, there are included two chapters on sample surveys and the use of survey techniques in specific organizational settings as well as two chapters on laboratory experimentation and on similar experiments as carried out in field settings. Again, the sections on data collection and analysis are partly oriented toward sampling procedures and interview techniques as well as toward observation of group performance. Of considerable interest to this reviewer were three chapters on primarily statistical questions. Kish writes on sampling procedures particularly as involved in the design of large-scale survey operations. Coombs writes on measurement theory emphasizing the analysis of ordered data and the use of scaling procedures. Smith's chapter contains an excellent discussion of the use of "efficient" statistical procedures and of statistical methods which are non-parametric, i.e., free of assumptions about the parameters of the unknown population distributions. Throughout the book, the authors of the individual chapters draw extensively on completed research for examples of the methodological questions being discussed.

Some general observations can be made on the volume as a whole. Throughout there is emphasized the fact that intelligent research design must be based on as sound a theory as possible and must anticipate the analysis as well as the collection of the data. The emphasis on method would appear to be based upon a belief in the importance of making concepts "operational" and thus testable by empirical means. In certain chapters, one becomes aware that research planning is in part a matter of economics; of the estimation of available research resources and of the recognition that any methodological choice

carries with it implications for the consumption of these resources. Finally, there is the emphasis that the research findings should be socially useful and that holding to such an objective carries with it certain consequences for the planning and execution of research.

Perhaps one comment is in order concerning the audience for which this volume would appear to be most appropriate. As a discussion of method, it clarifies the decisions about research techniques that must be faced and describes alternative methods from amongst which choices can be made. Such a discussion will be most helpful to readers who have experience of research, are aware of some of the difficulties and frustrations involved in planning it, and have an interest in the "tools of the trade" as such.

Gilbert K. Krulee.

Method and Theory in Experimental Psychology. Charles E. Osgood. New York, Oxford University Press (London: Geoffrey Cumberlege), 1953. pp. 800. 80*s*.

Professor Osgood, of the University of Illinois, has produced a book which is both comprehensive text and reference volume. Its unitary authorship gives balance and freedom from repetition not to be found in books written by a number of authorities, however good the editing. Osgood has been able to take up discussions at various points in different contexts, so that the book is more than a collection of abstracts of experiments arranged under headings; it is an intelligent account of the problems, methods and results of practically the whole field of experimental psychology. As such it will be a valuable book for students. The text is clearly written, and is illustrated with an excellent selection of graphs and diagrams.

The book starts, as is customary, with the Special Senses. It goes on to Perception, Learning and, finally, what are termed "Symbolic Processes", which include problem-solving and language. The treatment of the Special Senses is unusual in its scope. The discussion of brightness discrimination is particularly full and a real effort is made to relate the work of the electrophysiologists with perception. In this, as in later sections, numerous and well chosen references are given; many are from physiological journals which perhaps reflects the author's underlying philosophy. Theoretical issues are presented, many interesting questions being made explicit and relevant work cited, but on the whole the theoretical treatment in this section is disappointing. Perhaps it is unfortunate that there is no reference to Information Theory, or to what is to be expected in sensory information channels from the communication engineers' experience. Some reference to this type of theorizing would have made his discussions more valuable. A further lack is reference to clinical symptoms which in the study of vision, as in other psychological problems, can be useful in revealing the mechanism of normal function. Helmholtz's use of anomalous diploplia to reveal something of the mechanism of the stability of the visual field might be given as an example of this sort of thing in research on perception.

It is also surprising that no reference is made to the vast literature on reaction-times, which has recently become of great importance to theoretical understanding of the special senses.

The second section of the book, entitled "Sensory Processes", includes an excellent discussion of the rival views of the Gestalt and the Behaviouristic schools. Osgood is at his best in this section; he is eminently fair to both sides, and writes with unusual understanding of each. The experiments he cites are well chosen, both as representative of good work in this field, and for their relevance to his discussion. The diagrams showing the effects of Closure, Figure-and-Ground, Meaning, and so on, are unusually striking. The diagrams on page 214, showing the effect of Meaning on perceptual organization, are specially delightful. The outcome of the discussion in this section is that the two rival schools have approached each other in recent years until the differences are largely verbal. Osgood's review of evidence, and discussion of the rival theoretical positions,

might well prove to be an important contribution towards clarifying and resolving the differences still further.

The third section, on Learning, must have been the most difficult to write and is certainly the most difficult to read. The material is largely organized round questions. No attempt is made to present yet another Theory of Learning; instead we are presented with a critical account of the work of Hull, Guthrie, Skinner, Tolman, and other writers, and a selection of the bewildering experimental literature on the subject. It is a brave effort. How far is it successful? To a reader coming fresh to the subject, even with some knowledge of physiology, the importance of which is stressed, this section would probably convey little. To those who want to know just what it is that each leader of a School has to say the treatment would be unsuitable, because the Schools are not generally described apart from one another, the material being organized round problems rather than round the alleged answers. To appreciate this section it is necessary to agree with the author on what are the important problems, which implies a considerable prior knowledge of the subject. Part of the difficulty is due to the objective manner in which each writer's work is discussed; no point of view is dismissed at any stage; the possible points of view accumulate until one is left with what is probably a very fair picture of contemporary learning theory—a complexity and a profusion of irreconcilable statements defying order. There are, however, cases. The chapter entitled "Neurophysiology of Learning" (p. 474) is one; it is clear, cool, and concise; one would wish it longer.

The final section, largely on problem-solving, renews the Gestalt *v.* Behaviouristic controversy, and presents a good deal of recent and thought-provoking material. Not for the first time in the book, the author seems intentionally to avoid even tentative conclusions where a lesser man would present a case.

R. L. Gregory.

Instincts of the Herd in Peace and War: 1916–1919. Wilfred Trotter. London, Oxford University Press, 1953. pp. xvii & 219. 25*s.*

This is a curious book. Trotter's well-known discussion on the herd instinct was first published in book form in 1916, and an enlarged volume appeared in 1919. Successive impressions kept the work in print until 1937. It was reprinted in 1940, and is still available at 8*s.* 6*d.*, in an edition published in 1947 by Benn Brothers. Trotter died in 1939, and in about 1942 his manuscripts were given to the Bodleian Library, Oxford. It is on these manuscripts that the new Oxford edition is based. Dr. R. W. Chapman, the distinguished critic of Boswell and Jane Austen, has carefully compared the manuscripts, typescript, and earlier editions, and listed the discrepancies. Dr. Walshe, whose achievements in clinical neurology have been widely recognized in medical circles, contributes a foreword. The index has been enlarged.

For whom is this edition designed? Not the general reader, for whom Dr. Chapman, and your reviewer, consider Benn's edition sufficient. I do not think that there will be many specialists to whom the new edition will appeal. Walshe observes that because Trotter was only a surgeon, even though an eminent one, his writings were received coolly by the professional sociologists and psychologists of his generation. Walshe notes "Our tradition in learning today derives rather from Alexandria than from Athens." No discipline can claim a monopoly of truth, and we all derive stimulus and insight from the random observations and assertions of workers in other fields, and of those who work in none. The history of medicine, Trotter and Walshe's own profession, as much as that of social psychology, demonstrates the value of contributions made by those who have stood outside the professional fraternities of their time. But contributions to a discipline from outside can rarely have more than suggestive effect; they are no substitute for the plodding application of detailed techniques of observation and analysis which constitute the discipline. Trotter's work had some suggestive merit, and this was recognized when

it first appeared. But his book also contains a great deal that is of little lasting value. His long discussion on the characteristics of the German Empire is not based on any particularly detailed or penetrating study of German history or institutions, and is more of interest for what it tells us about Trotter himself than about Germany. It is an interesting instance of the kind of terms in which an intelligent medical man saw his national enemy in 1915. The preferences which he displays throughout the book are similarly of limited value for us. He dislikes the "social system of class segregation", and government by the "stable-minded", his ideal is of a nation directed by "intelligence" that would be so obviously unconquerable that war would cease to be a possibility, and that "would sail into the gulfs of the ether and lay tribute upon the sun and stars". These assertions are of little use towards understanding the class system, or bureaucratic resistance to change, or the prevention of war. If Trotter had lived centuries ago, and his work had long been unknown, then there might be a case for reprinting it as raw data for the historian of ideas. To reissue his work expensively when a cheaper edition is in print seems foolish.

For surely the core of Trotter's conceptual scheme contains little that is new to sociology, or indeed was new when he first wrote. Man lives in society; this affects his behaviour not only in crowds but at all times. Social pressure is in general a pressure to conform rather than to deviate. English and German societies are organized differently, and this has some influence on their behaviour in time of war. No-one would quarrel with this or find it very new. Trotter's analogies drawn from the dog, the wolf, and the honeybee, his "innermost conviction that the destruction of the German Empire is an indispensable preliminary to the making of a civilization tolerable by rational beings" can best be bequeathed to the historians.

J. A. Barnes.

Uncertainty and Business Decisions. C. F. Carter, G. P. Meredith and G. L. S. Shackle (eds.). Liverpool, The University of Liverpool Press, 1954. pp. 112. 10*s.* 6*d.*

In 1949, Mr. G. L. S. Shackle, at present Professor of Economics at the University of Liverpool, published a book entitled "Expectation in Economics" containing a criticism of certain fundamental assumptions underlying the traditional economic analysis of decision taking, and suggesting the outline of a new analysis. The present book contains a summary by Mr. Shackle of his theory and seven papers on it which were delivered at last year's meeting of the British Association. The seven papers were given by economists, philosophers, a mathematician and a psychologist, and there is also a summary by Professor Meredith and two shorter notes.

Historically stemming from Utilitarianism, the traditional economic analysis of the business man's decision taking provides, like this famous theory itself, neither an adequate tool for the analysis of actual human behaviour nor a practical guide to action. For it is based upon a concept of perfectly "rational" rather than actual behaviour and tends to make assumptions about the kinds of decisions made, given that certain clearly defined goals are to be achieved and that complete knowledge exists about the means of achieving them. Thus the economist's interpretation of the business man's decision-taking behaviour has tended to postulate him as faced with a series of possible actions each of which will yield a series of possible results. From this he is imagined to construct a probability distribution and to select that course of action which holds out the greatest hope of net gain. The difficulty with this is two-fold. In the first place it ignores the multiplicity of social and psychological forces that, even given perfect knowledge, affect decision taking in the real world. In the second place it ignores the fact that in any given state of knowledge the calculation of even approximate probabilities may be impossible.

It is the second of these two difficulties that Professor Shackle apparently finds most disturbing, as can be seen from the title of the present book. For the whole basis of any probability distribution depends upon the possibility of reasoning inductively from actual

experience of the past to expectation about the future, and thus many actual economic decisions in a rapidly developing society have the character of uniqueness, in that they are taken under conditions of uncertainty with little if any previous knowledge to serve as a guide. Accordingly, he has urged that the rationale of such decisions can only be assessed in terms of the subjective potential surprise which certain results would occasion in the mind of the individual making them.

As Dr. D. S. O'Connor puts it: "A decision of the unique kind envisaged by Shackle's theory is based on a proposition about a *single* event occurring *in the future*. A probability judgment interpreted on the frequency theory *purports* to be about such a single future event but is in reality an elliptical way of referring to a *large class* of events which have occurred *in the past*. The strength of the frequency interpretation of probable judgments is that it offers us a way of measuring the credibility of a given statement about the future. The strength of Shackle's theory is that it offers us a way of measuring the *certainty* that a given person attaches to a certain prediction."

Russell's well-known discussion upon degrees of belief and degrees of credibility will be recognized here, and in these terms it can be seen that Shackle's theory still begs the whole question of the concept of rationality. For it substitutes a subjective internal consistency for the subjective-objective consistency normally implied, and conspicuously fails to work out the relation between "potential surprise" and "credibility", i.e. between belief and evidence.

But in spite of the brilliance and sophistication of the discussion on these points one is left wondering why so much time is taken up with them and so little with an empirical study of how economic decisions are in fact made. From the point of view of economics as a science, Professor Williams is surely on much stronger grounds when he suggests that: "The classical postulate of rationality and the concept of the entrepreneur as the profit maximizing individual should be replaced by a sociological analysis of the goals of the firm in relation to its nature as an organization within the socio-political system." Mr. A. D. Roy, who contributes a paper on "The Possibility of Empirical Testing of Alternative Theories of Uncertainty", takes this point further and considers in outline the set-up of experiments designed to provide case studies towards this end. One is still struck however by the absence of references to such field studies as have actually been carried out or to the tools of field theory.

The science of economics has served a long apprenticeship with philosophy, mathematics and logic. It is to be hoped that these disciplines will stand it in good stead when its exclusive concern with certain aspects of human behaviour becomes more fully realized. There are signs from this book that such realization is taking place more rapidly than before and as it proceeds one might expect the greater incorporation into economic theory of knowledge from its allied social sciences.

J. M. M. Hill.

Who Shall Survive? J. L. Moreno. New York, Beacon House, 1953. pp. cxiv & 763. $10.

The 1934 edition of *Who Shall Survive?* is a rare book, so that a new edition is welcome, if for that reason alone. This massive and expensive volume also contains certain additions to the original. Chief among these is a 100-page preface entitled "Preludes of the Sociometric Movement"—an autobiographic history of sociometry. It makes good reading: we learn, for instance, that "the genesis of psychodrama was closely related to the genesis of the Godhead" (p. xvi), that one of Moreno's books was written in red ink on the walls of an Austrian castle (p. xxxvii), and that the relation of Moreno to Freud has been described as that of diarrhoea to constipation (p. xxviii). We go on to read about how Moreno brought about the passing of psychoanalysis (pp. xliii–lv), and how Lippitt, Zander, Bavelas and French "published distorted versions

of (his) ideas and techniques", though apparently the honest Lewin "was rather naïve as to their astute and Machiavellian practices" (pp. xcix–cvi). We are finally provided with an explanation of why Moreno is not the Professor of Sociology at Harvard (p. xxxix) or President of the American Psychiatric Association (p. xc).

The main body of the book is much the same as before, presenting data and a great deal of discussion on (i) the changes of sociometric patterns in groups of children of different ages, (ii) the analysis of the sociogram of a village of 500–600 people, and (iii) the results of allowing free choice of dormitory in a girls' reformatory, particularly the reduction in the number running away.

Other additions to the 1934 edition include a number of Moreno's papers on various subjects, a bibliography of 1200 titles (most of these are not referred to in the book), and a series of "Hypotheses". Some of the hypotheses are of the type "Mankind is a social and organic unity" and "A body of therapeutic procedures cannot have less an objective than the whole of mankind". Others summarize genuine empirical results, others are empirical guesses.

Sociometry is a valuable method; good use has been made of it, and some of the later statistical developments are very interesting. It is a pity, therefore, that this should be somewhat obscured by passages that fall below an acceptable level of scientific objectivity.

Michael Argyle.

The Teaching of the Social Sciences in the United Kingdom. Paris, UNESCO, 1953. pp. 140. 6*s*. $1.00. 300 f.

This Unesco pamphlet is a helpful guide to the teaching of the social sciences in this country, but the information provided is necessarily too sketchy to be of much value to anyone able to make direct inquiries. Its most useful purpose will probably be to help students from overseas to get some idea of the facilities available in this country. It is obviously impossible, in a document of this sort, to assess the strong and weak points of the universities and university departments referred to, and this lack is hardly remedied by the brief account of researches being undertaken in them. To this reviewer's knowledge, certain important pieces of work are not referred to, whilst others of considerably less significance are mentioned. This gives a somewhat unbalanced picture in certain instances. The details would appear in general to be accurate, although of course the picture changes from year to year, even from term to term, and a work like this is, to some extent, out of date before it is published. In some cases however, there are omissions which might well affect a choice of university by a student who had no other means but this pamphlet of deciding where to study.

Incidentally, it is an interesting commentary on the position of sociology, social anthropology and social psychology, that they only occupy twenty-five pages out of a total of one hundred and eleven devoted to different branches of social science, the main topics considered being economics, political science and law.

A. C. T. W. Curle.

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